MONTHLY WEATHER REVIEW.

Editor: Prof. Cleveland Abbe. Assistant Editor: Frank Owen Stetson.

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The Monthly Weather Review is based on data from about 3500 land stations and many ocean reports from vessels taking the international simultaneous observation at Greenwich noon.

Special acknowledgment is made of the data furnished by the kindness of cooperative observers, and by Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt I. S. Kimball, General Superintendent of the United States Life-Saving Service; Commandant Francisco S. Chaves, Director of the Meteorological Service of the Azores, Ponta Delgada, St. Michaels, Azores; W. N. Shaw, Esq., Secretary, Meteorological Office, London; H. H. Cousins, Chemist, in charge of the Jamaica Weather Office; Señor Anastasio Alfaro, Director of the National Observatory, San José, Costa Rica; Rev. L. Gangoiti, Director of the Meteorological Observatory of Belen College, Havana, Cuba.

As far as practicable the time of the seventy-fifth meridian, which is exactly five hours behind Greenwich time, is used in the text of the Monthly Weather Review.

Barometric pressures, both at land stations and on ocean vessels, whether station pressures or sea-level pressures, are reduced, or assumed to be reduced, to standard gravity, as well as corrected for all instrumental peculiarities, so that they express pressure in the standard international system of measures, namely, by the height of an equivalent column of mercury at 32° Fahrenheit, under the standard force, i. e. apparent gravity at sea level and latitude 45°.

SPECIAL ARTICLES, NOTES, AND EXTRACTS.

STRUCTURE OF HAILSTONES.

By Mr. E. S. Webster. Dated Hutchinson, Kans., April 2, 1906.

On page 445 of the Monthly Weather Review for October, 1905, in a paragraph headed "Structure of Hailstones," there was a request to observers to make observations as to whether a hailstone gave up a bubble of air when melting in water; so during quite a severe hailstorm which occurred here from 9 to 9:45 o'clock on the evening of March 25, 1906, I collected several hailstones, from 1 to 1⅝ inches in diameter, and put about 25 in clear water and 15 in soapsuds, as suggested; but not one of them gave up any air bubble in melting. The hailstones were mostly quite smooth and generally nearly round, though some were somewhat flattened, and were mostly formed with a center of white ice, then a layer of clear ice, and then the outside layer of white ice. A few were quite rough, appearing as if several small stones had been frozen on to the outside of the large ones, and were almost entirely composed of clear ice. At the beginning of the storm the stones were small, from ¼ to ½ inch in diameter, gradually increasing in size until at last they were from 1 to 1⅝ inches in diameter.

We shall be very glad to receive reports of similar experiments by other observers. There are three plausible hypotheses as to the origin of the snowy ice at the center of a hailstone.

(a) The hailstone may have begun with the formation of a ball of snow, and the clear ice may be a deposit of cold water, frozen a few seconds later by the cold of the surrounding atmosphere. In this case the air that is mixed with the snowy ice at the center would be compressed by the freezing of the surrounding clear ice, and would be liberated as a bubble when the hailstone is melted under water.

(b) The nucleus of the hailstone may have been at first a large drop of water, containing dissolved air, which is forced out by the process of freezing, precisely like the bubbles of air that are seen in cakes of artificial ice. Cold water can dissolve an appreciable percentage of its volume of air, all of which is extruded when water freezes; a bubble of highly compressed air might thus be formed at the center of the hailstone. If such a hailstone be melted in cold water slowly, all of this air will be redissolved, and no bubble will be seen to rise to the surface. If the stone be dissolved in hot water rapidly, or especially if the stone be crushed forcibly and quickly under water, the air may escape as a bubble without having had time to be redissolved.

(c) A hailstone formed of pure water that has had no opportunity to absorb or dissolve air can be reduced to a temperature far below freezing, but will eventually suddenly turn to ice, at which moment its temperature will rise to 32° F., and it will assume a crystalline structure, so as to resemble snow. Such a hailstone has, therefore, a snowy nucleus without any inclosed air, and on being melted under water will of course show no bubble. In fact, the central space is occupied, not by air, but by the vapor of water only, and as the pressure is very small, we may liken this to a partial vacuum.

All these three forms of hailstones, and other forms as yet unthought of, are possible; and if we could invent methods of distinguishing between these three kinds of hailstones, we should have a better knowledge of what goes on in the upper air during the formation of hail.

Those who have proper conveniences will find that the study of hailstones under polarized light gives additional information as to their crystalline structure, but has not as yet told us much about the process of formation.

As ice is a poor conductor of heat, it is worth while to make some effort to determine the temperature of the interior of a large hailstone. The external surface may safely be assumed to have the temperature of evaporation or the average wet-bulb temperature prevailing in the lower thousand feet of air through which the hail has rapidly fallen, but the center must be at a temperature more nearly corresponding to that at which the nucleus was formed. There is, therefore, a state of strain that should be revealed by polarized light. The average temperature of the whole hailstone may be easily and directly determined by allowing hail to melt within a calorimeter, where the heat consumed can be determined, and then the temperature be computed.

Before making such researches on hailstones, we must devise methods of catching them that will prevent injury or warming or even melting by reason of the shock that occurs when the hail strikes the hard ground. Probably it would be sufficient to catch the hail in the "bag gage for hail," described in the Monthly Weather Review for September, 1897, Vol. XXV, p. 210, or on a bed of soft cotton, or in a barrel half full of water. Pieces of strong cloth or paper spread on water will catch a large hailstone nicely; the momentum of the hail carries the cloth downward and it is quickly wrapped about the hail.—*C. A.*

STUDIES ON THE THERMODYNAMICS OF THE ATMOSPHERE.

By Prof. FRANK H. BIGELOW.

III.—APPLICATION OF THE THERMODYNAMIC FORMULÆ TO THE NONADIABATIC ATMOSPHERE.

THE NONADIABATIC ATMOSPHERE.

In the preceding papers of this series it has been shown that in the latitudes of the temperate zones the atmosphere is not arranged in such a way that the thermal gradients conform to the adiabatic rate of change along the vertical, $-\frac{dT}{dz} = 9.867°$ C. per 1000 meters, but that they depart from that rate, being generally much less. In the tropical zones the few available observations indicate that in the lower strata the temperature gradient exceeds that amount, or is equal to it. Thus O. L. Fassig[1] found the mean of four ascents at Nassau, in June-July, 1904, to be 28.3° C. at the surface and 18.3° C. at 1000 meters, evidently the adiabatic rate. H. Hergesell[2] found for 16 ascents on the Atlantic, in the region between the African coast, the Canaries, and the Azores, the following temperatures:

Height.	T	ΔT	
Meters.	°C.	°C.	
5000	(−10.0)		
4000	− 1.5	− 8.5	Adiabatic gradient.
3000	9.0	−10.5	
2000	18.0	− 9.0	
1000	26.4	− 8.4	
0	23.0	+ 3.4	

This is an average adiabatic rate from the lower cloud level to 5000 meters, but differs widely from that rate from the surface to 1000 meters. He also reports[3] an adiabatic rate, for the ascensions of 1905, from the surface to 1350 meters, then a zero or even a positive temperature gradient to 3550 meters, above that a rather rapid fall to 13,000 meters, and higher still in the atmosphere a slower rate, indicating an intrusion of warm air.

As the result of my kite work from the U. S. S. *Cæsar*, over the North Atlantic Ocean between Hampton Roads and Gibraltar, during the Spanish Eclipse Expedition, I found the temperatures as follows, for the dates June 24, 26, 28, 29, 30, July 5, and September 22, 1905:

Height.	Mean of 5 ascents.	July 5.	Sept. 22.
Meters.	°C.	°C.	°C.
1000	16.9	7.9	15.6
800	17.1	9.3	17.9
600	17.6	11.1	18.5
400	18.5	13.2	14.6
200	19.6	15.6	17.8
0	22.1	18.0	20.9

These evidently approximate the adiabatic rate on July 5, but depart from it on the other dates, notably on September 22, when the kite ran through a warm stratification, probably blown from the peninsula of Spain over the ocean. These examples show plainly that meteorologists must be prepared to discuss the problems of the circulation of the atmosphere whether the thermal vertical gradients are adiabatic or not, and since our common formulæ are confined to the adiabatic case, it is an important study to learn how they can be practically modified and rendered flexible enough to meet the actually existing conditions.

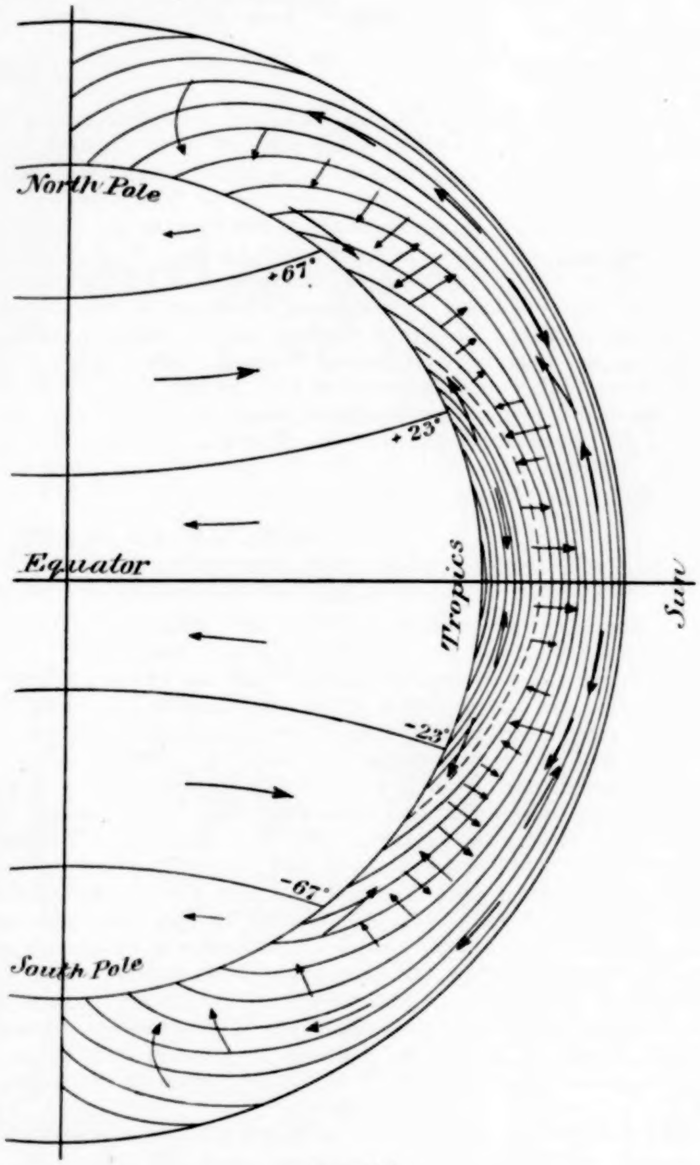


FIG. 11.

I have made an attempt to indicate the probable arrangement of the isothermal surfaces in the earth's atmosphere by means of fig. 11. In the tropical zones the adiabatic rate prevails up to a certain height, as the dotted line, and above that a slower rate. In the temperate zones there is an intrusion of the adiabatic rate into the lower levels and a mixing area, but generally the temperature-fall is less than the adiabatic rate, resulting in a small gradient near the surface and up to 3000 meters, a more rapid fall to 10,000 meters, and again a slower fall due to a second intrusion of warm air from the Tropics. In the polar zones the temperature gradients are probably small, the air being generally cold, and having only small changes from the surface upward. These suggested isothermal lines should be compared with the circulation described in my paper, MONTHLY WEATHER REVIEW, January, 1904, fig. 19, where the results of this intrusion of the types I and II between the temperate and the tropical zones are explained. The arrows are reproduced on fig. 11, where it is seen that three circuits are proposed for each hemisphere; (1)

[1] Kite flying in the Tropics. O. L. Fassig. M. W. R., December, 1903.

[2] Sur les ascensions de cerfs-volant exécutées sur la Méditerranée et sur l'ocean Atlantique ...., 1904. H. Hergesell. Note in Comptes Rendus, Jan. 30, 1905.

[3] Die Erforschung der freien Atmosphäre über dem Atlantischen Ocean ...., 1905. H. Hergesell. Met. Zeit. November, 1905.

the tropic, circulating anticlockwise; (2) the temperate-tropic, circulating clockwise; and (3) the temperature-polar, circulating feebly anticlockwise for the Northern Hemisphere. In the temperate zones the local cyclonic and anticyclonic systems represent the products of the vertical as well as the horizontal mixing of the currents of air derived by transportation from different latitudes. The excess of heat of the Tropics, producing an adiabatic distribution of temperature in their lower strata, works out poleward at the top and at the bottom by irregular streams, which produce a varying system of temperature gradients in the atmosphere of the temperate zones, standing about midway in value, namely, 5.0° C. per 1000 meters, between that prevailing in the Tropics, 9.87° C. per 1000 meters, and that probably prevailing in the polar zones, as 2.0° to 3.0° C. per 1000 meters. The interchange of heat between the Tropics and the polar zones is by means of these three more or less irregular circuits, which produce primarily the well-known masses of permanent high or low pressure areas standing over the oceans and continents, and secondarily the rapidly migrating cyclonic gyrations of the temperate zones. We shall make an effort to approach our study of this complex circulation by a transformation of the thermodynamic formulæ into forms which will be suitable for computations in the actual atmosphere, as distinguished from an adiabatic but fictitious atmosphere, which has commonly been discussed by meteorologists.

DEVELOPMENT OF THE THERMODYNAMIC FORMULÆ.

In the formulæ derived for discussing the circulation of the atmosphere, it is important that the velocity should be expressed as a function of the temperature in a nonadiabatic atmosphere. It has been generally the custom to treat the velocity as a function of the pressure P, the density ρ, and the gravity g, but it will be equally valid and more valuable to make it a function of the temperature T, the specific heat at a constant pressure C_p, and the gravity g. We must in doing this assume the applicability of two physical laws in the atmosphere. There has been a difficulty in connecting the results obtained by these two methods, which will be pointed out in this paper and their reconciliation will be explained.

I. THE FIRST FORM OF THE BAROMETRIC FORMULA.

The special feature of this formula is that the density ρ is eliminated by the following process: Assume the Boyle-Gay-Lussac law, $P=\rho RT$, and the pressure law, $-dP=\rho g dz$,

(1) Then, $-\frac{dP}{P} RT = g dz.$

Since $R = \frac{P_0}{\rho_0 T_0}$, for the standard conditions, we have,

$$(2) \qquad -\frac{dP}{P} \frac{P_0 T}{\rho_0 T_0} = g dz.$$

By definition $P_0 = B_0 \rho_m g_0$, and $\frac{dP}{P} = \frac{dB}{B}$, so that,

$$(3) \qquad -\frac{dB}{B} \cdot \frac{B_0 \rho_m g_0}{\rho_0 M} \frac{T}{T_0} = g dz, \text{ for common logs.}$$

For the hypsometric formula the gravity g is computed from the standard gravity g_0 by the factors, $(1+\gamma)=(1+0.0026 \cos 2\varphi)$ for latitude, and $\left(1 + 1.25 \frac{h}{R}\right) = (1+0.000000196)\, h$ for altitude, since $g_0 = g(1+\gamma)\left(1 + 1.25 \frac{h}{R}\right)$.

In integrating for an atmosphere composed of dry and moist air between the heights z_0 and z, the temperature term T, which is variable, is taken as the mean temperature of the air column $z-z_0$, and the moist air is accounted for by the factor, $(1+\beta)= \left(1+0.378 \frac{e}{B}\right)$, where e is the vapor tension. Hence, the integral mean temperature is,

$$\frac{1}{z}\int_{z_0}^{z} T = T_m, \text{ and } \frac{T_m}{T_0} = (1+0.367\theta) = (1+a\theta).$$

We must pass from $\frac{P_0}{P} = \frac{B_0}{B}\left(1 + 1.25 \frac{h-h_0}{R}\right)$, to logarithms, $\log \frac{P_0}{P} = (1+.00157) \log \frac{B_0}{B} = (1+\eta) \log \frac{B_0}{B}$, by adding the factor $(1+\eta)$.

Finally, $\frac{B_0 \rho_m}{\rho_0 M} = K = 18400,$

$$\left.\begin{array}{l} \text{for } B_0 = 0.760 \text{ meter} \\ \rho_m = 13595.8 \\ \rho_0 = 1.29305 \\ M = 0.43429 \end{array}\right\} \text{in the meter-kilogram system.}$$

Hence, by integration,

$$(4) \quad -\int_{z_0}^{z} \frac{dB}{B} \cdot \frac{B_0 \rho_m g_0}{M \rho_0} \cdot \frac{T\left(1 + 0.378 \frac{e}{B}\right)}{T_0} = \int_{z_0}^{z} g dz, \text{ because,}$$

$$(5) \quad \log \frac{B_0}{B} \cdot \frac{K g_0}{T_0} T_m \left(1 + 0.378 \frac{e}{B}\right) = g_m (z - z_0).$$

If $\frac{K g_0}{T_0} = K_1$ is computed as a new barometric constant, and

$T_m\left(1 + 0.378 \frac{e}{B}\right) = T_v$, the virtual temperature, then,

$$(6) \quad K_1 T_v \log \frac{B_0}{B} = g_m (z - z_0) \text{ in mechanical units.}$$

I have computed the logarithmic tables 91, 92, 93 of the International Cloud Report, 1898, in such a form that the dry air temperature term m, the humidity term βm, and the gravity term γm, are kept separate from each other in

$$(7) \qquad \log B_0 = \log B + m - m\beta - m\gamma,$$

for the sake of accurate and flexible applications in all possible meteorological computations. Auxiliary tables can be constructed from these primary tables for any desired applications, by way of shortening the work in special cases, such as in numerous reductions to any selected plane, or in computing the pressures from point to point in the atmosphere, using as arguments the temperatures and humidities observed in balloon or kite ascensions. Especially, they can be used to compute the dynamical units of force, or work required to pass from point to point, by simply extracting $(z - z_0)$ from the tables, with the temperature, humidity, and pressure as the arguments and multiplying $(z - z_0)$ by g_m, so that

$$(8) \qquad -\int_{z_0}^{z} \frac{dP}{\rho} = g_m (z - z_0),$$

when there is no circulation or velocity term, $\frac{1}{2}(q^2 - q_0^2)$. This result is in conformity with the equation,

$$-dP = \rho g dz,$$

with which we began this discussion.

II. THE SECOND FORM OF THE BAROMETRIC FORMULA IN AN ADIABATIC ATMOSPHERE.

In formula (108a) of my collection in the International Cloud Report the abnormal form for dry air was written:

$$(9) \qquad \frac{P}{P_0} = \left(\frac{T_0 - \theta_m h}{T_0}\right)^m, \text{ which is}$$

$$\frac{B}{B_0} = \left(\frac{T_0 - \frac{dT}{dh} h}{T_0}\right)^m = \left(\frac{T}{T_0}\right)^m,$$

where $-\frac{dT}{dh}$ is the actual vertical gradient of temperature and

the exponent is undetermined. We acquire from the observations a vertical gradient, $-\frac{dT}{dh}$, which generally differs from the adiabatic gradient, $-\frac{dT_a}{dh}$, and seek to determine the proper value of the exponent m.

From my formula (73), in the adiabatic state for $dQ = 0$, we have $0 = C_p dT - RT\frac{dP}{P}$, in mechanical units.

(10) Hence, $\frac{dP}{P} = \frac{C_p}{R}\frac{dT}{T}$, and integrating,

(11) $\log\frac{P}{P_0} = \frac{C_p}{R}\log\left(\frac{T}{T_0}\right)$, or $\frac{P}{P_0} = \left(\frac{T}{T_0}\right)^{\frac{C_p}{R} = \frac{k}{k-1}}$.

(12) Again, $\frac{C_p}{R} = -g\frac{dz}{dT}\cdot\frac{T_0}{l_0 g_0} = -g\frac{dz}{dT}\cdot T_0\cdot\frac{\rho_0}{P_0}$, and

(13) $\frac{C_p}{R} = -\frac{dz}{dT}T_0\frac{g\rho_0}{g_0\rho_m B_0}$. Substituting in (10)

(14) $\frac{dB}{B} = -\frac{dz}{dT}\cdot T_0\frac{g}{g_0}\frac{\rho_0}{\rho_m B_0}\cdot\frac{dT}{T}$. Hence,

(15) $\int_{z_0}^{z} g\,dz = -\frac{B_0\rho_m g_0}{M\rho_0 T_0}\frac{1}{z}\int_{z_0}^{z} dT\frac{dB}{B}$, for $T = \frac{1}{z}\int_{z_0}^{z} dT$,

as before. Hence, we see that $\frac{C_p}{R}$ supplies the constants for the barometric constant K *in the adiabatic case only*. These substitutions, (12), (13), can be verified by referring to the formulæ of Table 14. It is well known that the use of the formula $\frac{B}{B_0} = \left(\frac{T}{T_0}\right)^{\frac{k}{k-1}}$ is not applicable in the actual atmosphere, except to give what is called by von Bezold the potential temperature T_0, corresponding with $(B\,.\,T)$ when reduced to the standard pressure B_0.

Making the following substitutions,

$B_0\rho_m g_0 = P_0$, $\frac{P_0}{\rho_0 T_0} = R$, and $\frac{1}{z}\int_{z_0}^{z} d\,T = T_m$, we have

(16) $g(z - z_0) = R\,T_m\log\frac{P_0}{P}$ in Naperian logarithms, and

(17) $\log\frac{P_0}{P} = \frac{g}{R}\frac{z-z_0}{T_m}$, or $\frac{P_0}{P} = e^{\frac{g}{R}\frac{z-z_0}{T_m}}$

This result can be obtained again by another process.

Assume, $-dP = +g\rho\,dz$, and $\rho = \frac{P}{RT}$,

Then, $-\frac{dP}{P} = +\frac{g}{R}\frac{dz}{T}$, and by integrating,

$(17)_a$ $\log\frac{P_0}{P} = \frac{g}{R}\int_{z_0}^{z}\frac{dz}{T} = \frac{g}{R}\cdot\frac{z-z_0}{T_m}$.

III. THE BAROMETRIC FORMULA IN A NONADIABATIC ATMOSPHERE.

In the preceding case it has been assumed that the temperature varies with the height by the adiabatic law, which is, $-\frac{dT_a}{dz} = \frac{g_0}{C_p} = \frac{1000}{P_0} = 0.0098695$ °C., so that the temperatures of the formulæ of section II, of which $\frac{P}{P_0} = \left(\frac{T}{T_0}\right)^{\frac{k}{k-1}}$ is the representative, must have this relation. Now it is known that this formula in the atmosphere does not apply, except in occasional instances, and we, therefore, shall seek a formula of the same type which will admit other temperature gradients, $-\frac{dT}{dz}$, in a quasi-adiabatic atmosphere. It has been assumed that there was no addition or subtraction of heat in the variation of the pressures and temperatures, but as this is only a special case it will be proper to take the general case, where the quantity of heat dQ is added or subtracted, besides that acquired or lost during the expansion and contraction processes. Since in the stratifications of the atmosphere by currents possessing different thermodynamic properties, there is departure from the adiabatic state by the term dQ, we shall resume the full equation for discussion.

Fig. 12 will make our treatment clear.

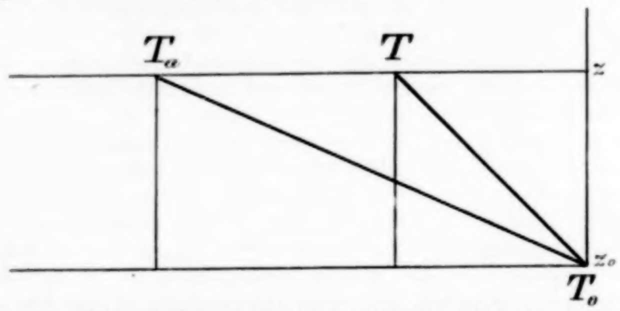


FIG. 12.—The relation of the observed to the adiabatic gradient.

Let T_0 = the initial temperature at the height z_0
T_a = adiabatic temperature at the height z
T = observed temperature at the height z

Then the adiabatic gradient is $a_0 = -\frac{dT_a}{dz} = \frac{T_0 - T_a}{z - z_0}$,

and the observed gradient is, $a = -\frac{dT}{dz} = \frac{T_0 - T}{z - z_0}$.

Let the ratio of these gradients, $n = \frac{dT_a}{dT} = \frac{T_0 - T_a}{T_0 - T}$.

Having regard to the adiabatic thermodynamic equation,

(18) $0 = C_p dT_a - \frac{dP}{\rho}$

we observe that the thermal mass passes from $(T_0 z_0)$ to $(T_a z)$ by the oblique path marked, T_0 to T_a, in conformity with the formulæ just discussed; it can then be carried from the point T_a to the point T at the same level z by changing the temperature through $(T - T_a)$, and the addition of the heat

$Q = C_p(T - T_a)$. Now we have,

(19) $0 = C_p(T_a - T_0) - \int_{z_0}^{z}\frac{dP}{\rho}$, from (18), and adding,

(20) $Q = C_p(T - T_a)$, we obtain,

(21) $Q = C_p(T - T_0) - \int_{z_0}^{z}\frac{dP}{\rho}$, or in the differential form

(22) $dQ = C_p dT - \frac{dP}{\rho}$.

Since $dT_a = n\,dT$, we have $dQ = C_p(dT - dT_a) = C_p dT - C_p n\,dT$.

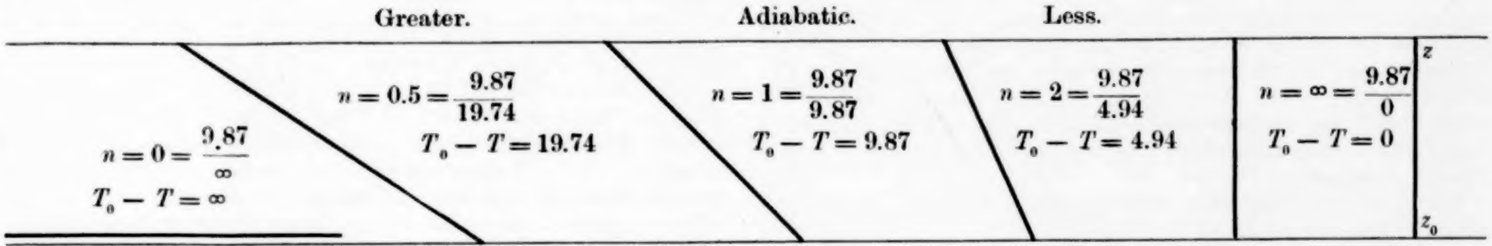
Subtracting this value of dQ from equation (22) we find,

(23) $0 = C_p n\,dT - \frac{dP}{\rho}$, in a quasi-adiabatic form,

which is true in a stratum where n is constant, that is, where the gradient $-\frac{dT}{dz}$ is not changing.

Substituting, $\frac{1}{\rho} = \frac{RT}{P}$, we have,

(24) $0 = nC_p\,dT - RT\frac{dP}{P}$, and



$$\frac{P}{P_0} = \left(\frac{T}{T+\infty}\right)^{0\frac{k}{k-1}} = \left(\frac{T}{T+\infty}\right)^{0} = \left(\frac{1}{\infty}\right)^{0} = 0 \qquad P = 0 \times P_0 = 0$$

$$\frac{P_{0.5}}{P_0} = \left(\frac{T}{T+19.74}\right)^{0.5\frac{k}{k-1}} = \left(\frac{T}{T+19.74}\right)^{1.73} = A_{0.5} < A_1 \qquad P_{0.5} = A_{0.5} P_0 < P_1$$

$$\frac{P_1}{P_0} = \left(\frac{T}{T+9.87}\right)^{1\frac{k}{k-1}} = \left(\frac{T}{T+9.87}\right)^{3.46} = A_1 < A \qquad P_1 = A_1 P_0 < P_2$$

$$\frac{P_2}{P_0} = \left(\frac{T}{T+4.94}\right)^{2\frac{k}{k-1}} = \left(\frac{T}{T+4.94}\right)^{6.92} = A_2 < 1 \qquad P_2 = P_0 A_2 < P_0$$

$$\frac{P_\infty}{P_0} = \left(\frac{T}{T}\right)^{\infty\frac{k}{k-1}} = \left(\frac{T}{T}\right)^{\infty} = 1^\infty = 1 \qquad P_\infty = P_0$$

FIG. 13.—The variations of the ratio $n = \frac{dT_a}{dT}$.

$$(25) \qquad 0 = \frac{nC_p}{R}\frac{dT}{T} - \frac{dP}{P}, \qquad \text{so that,}$$

$$(26) \qquad \frac{P}{P_0} = \left(\frac{T}{T_0}\right)^{\frac{nC_p}{R}} = \left(\frac{T}{T_0}\right)^{n\frac{k}{k-1}} = \left(\frac{T}{T_0}\right)^{-\frac{g}{R}\frac{dz}{dT}} = \left(\frac{T}{T_0}\right)^{\frac{g}{Ra}}.$$

The last forms are found as follows:

By definition, $-\frac{dT_a}{dz} = a_0 = \frac{g}{C_p}$, and the ratio,

$$n = \frac{dT_a}{dT} = \frac{a_0}{a} = \frac{g}{C_p a} = \frac{g}{C_p}\frac{dz}{dT}. \quad \text{Since } \frac{k}{k-1} = \frac{C_p}{R},$$

$$(27) \qquad n\frac{k}{k-1} = \frac{g\frac{k}{k-1}}{C_p a} = \frac{g}{Ra} = -\frac{g}{R}\frac{dz}{dT}.$$

Our formula, therefore, differs from the adiabatic formula by the factor n in the exponent with $\frac{k}{k-1}$. This ratio n between the adiabatic and observed gradients, depends upon the amount of heat added or subtracted from an adiabatic atmosphere to produce the given observed atmosphere within the stratum $z—z_0$ where the gradient remains a constant. We can evidently pass from one stratum to an adjoining stratum either continuously by changing n gradually, or discontinuously by changing n abruptly. The ratio n is a new variable to be introduced into the thermodynamic equations in their application to the atmosphere, so that all the standard thermodynamic equations and discussions become available with this simple modification. Such an exposition as was given by M. Margules in his admirable paper, "Über die Energie der Stürme," which is limited to the adiabatic case, may be modified in this way and be made very useful in practical meteorology. It is rarely the case that computations of T_0 to T, from one level to another, z_0 to z, can be made by general dynamic formulæ, but they must usually be observed with balloons and kites.

The ratio, $n = \frac{dT_a}{dT} = \frac{\text{adiabatic gradient}}{\text{observed gradient}}$, can range between the limits $n = 0$ and $n = \infty$; for $n = 1$ the gradient is adiabatic; for $n < 1$ the cooling is more rapid than in the adiabatic gradient, as in summer afternoons when the ground is superheated and cumulus clouds are forming; for $n > 1$ the cooling is less rapid than in the adiabatic gradient, as generally in the temperate and polar zones; the Tropics probably conform to the adiabatic gradient in the lower strata of the atmosphere.

IV. CONSTRUCTION OF THE PRIMARY DIFFERENTIAL EQUATION.

Under the assumption that n is variable we now differentiate the equation with the variables P, T, n,

$$(28) \qquad \frac{P}{P_0} = \left(\frac{T}{T_0}\right)^{n\frac{k}{k-1}}.$$

Passing to logarithms,

$$(29) \qquad \log\frac{P}{P_0} = n\frac{k}{k-1}\log\left(\frac{T}{T_0}\right), \qquad \text{or for one limit,}$$

$$(30) \qquad \log P = n\frac{k}{k-1}\log T. \qquad \text{Differentiate,}$$

$$(31) \qquad \frac{dP}{P} = n\frac{k}{k-1}\frac{dT}{T} + \frac{k}{k-1}\log T dn. \qquad \text{Substitute } \frac{1}{P} = \frac{1}{\rho RT},$$

$$(32) \qquad \frac{dP}{\rho RT} = n\frac{k}{k-1}\frac{dT}{T} + \frac{k}{k-1}\log T dn. \qquad \text{Substitute } R\frac{k}{k-1} = C_p,$$

$$(33) \qquad \frac{dP}{\rho} = nC_p dT + C_p T \log T dn. \qquad \text{In common logs and to } dz,$$

$$(34) \qquad \frac{dP}{\rho dz} = nC_p\frac{dT}{dz} + C_p T \log T\frac{dn}{dz}, \qquad \text{for the vertical direction.}$$

Again, since $nC_p\frac{dT}{dz} = -g$, by this substitution we have,

$$(35) \qquad \frac{dP}{\rho dz} = -g + C_p T \log T\frac{dn}{dz}, \qquad \text{and hence,}$$

$$(36) \qquad dP = -\rho g dz + \rho C_p T \log T dn.$$

We see then that the effect of the change from an adiabatic atmosphere to any other gradient is accomplished by adding the term $\rho C_p T \log T dn$.

If it should happen that besides the strictly mechanical velocities thus indicated there is a further expenditure of heat by radiation, it would be necessary to add the special term, $Q_0 - Q$, making, from (33),

$$(37) \qquad \frac{P}{\rho} - \frac{P_0}{\rho_0} = (Q_0 - Q) + nC_p(T - T_0) + C_p T \log T(n - n_0)'.$$

It is better to say that the full term $C_p T \log T(n - n_0)$ has a radiation part, $(Q - Q_0)$, and a velocity part, $C_p T \log T(n - n_0)'$.

The factor n, due to an addition or subtraction of heat other than by adiabatic expansion and contraction, fully accounts for the presence of a nonadiabatic gradient, through the stratification of the layers of air due to transportation horizontally from one latitude to another, or generally from one place to another; or else through the addition or subtraction of latent heat in the condensation of aqueous vapor to water, or by the

vaporization of water to aqueous vapor. In effect, by the practical use of the factor n, we can dispense with the difficult computations which occur in making an allowance for the action of the vapor contents of the atmosphere; or, on the other hand, we can substitute for n its equivalent in terms of such other computations as may be found convenient for particular purposes.

The corresponding formulæ involving P, T, R, ρ, and n, in terms of the temperature T, become,

$$(38)\quad \frac{P}{P_0}=\left(\frac{T}{T_0}\right)^{\frac{nk}{k-1}};\ \log P=\log P_0+n\frac{k}{k-1}(\log T-\log T_0).$$

$$(39)\quad \frac{\rho}{\rho_0}=\left(\frac{T}{T_0}\right)^{\frac{n}{k-1}};\ \log \rho=\log \rho_0+\frac{n}{k-1}(\log T-\log T_0).$$

$$(40)\quad \frac{R}{R_0}=\left(\frac{T}{T_0}\right)^{n-1};\ \log R=\log R_0+(n-1)(\log T-\log T_0).$$

$$(41)\quad \frac{\rho}{\rho_0}=\left(\frac{P}{P_0}\right)^{\frac{1}{k}};\ \log \rho=\log \rho_0+\frac{1}{k}(\log P-\log P_0).$$

It is evident that R is not constant except in the adiabatic system for $n=1$; and that only that density determined through the use of n is generally valuable in the atmosphere.

V. APPLICATION TO THE GENERAL EQUATIONS OF MOTION.

We will now make the connection between this system of equations and the general equations of motion which have been employed in meteorology. From the equations (200) of the Cloud Report, we have, in connection with the differentiations of equation (37) along the axes x, y, z, for the *acceleration*,

$$(42)\quad \begin{cases} -\frac{1}{\rho}\frac{\partial P}{\partial x}=\frac{du}{dt}-\cos\theta(2n+\nu)v+\frac{uw}{r} \\ =\frac{\partial Q}{\partial x}-C_p n\frac{\partial T}{\partial x}-C_p T\log T\frac{\partial n}{\partial x} \\ -\frac{1}{\rho}\frac{\partial P}{\partial y}=\frac{dv}{dt}+\sin\theta(2n+\nu)w+\cos\theta(2n+\nu)u \\ =\frac{\partial Q}{\partial y}-C_p n\frac{\partial T}{\partial y}-C_p T\log T\frac{\partial n}{\partial y} \\ -\frac{1}{\rho}\frac{\partial P}{\partial z}=\frac{dw}{dt}-\sin\theta(2n+\nu)v-\frac{u^2}{r}+g \\ =\frac{\partial Q}{\partial z}-C_p n\frac{\partial T}{\partial z}-C_p T\log T\frac{\partial n}{\partial z}. \end{cases}$$

Multiplying by dx, dy, dz, the equations for *work* are,

$$(43)\quad \begin{cases} -\frac{\partial P}{\rho}=udu-\cos\theta(2n+\nu)v\partial x+\frac{uw\partial x}{r} \\ =\partial Q-C_p n\partial T-C_p T\log T\partial n \\ -\frac{\partial P}{\rho}=vdv+\sin\theta(2n+\nu)w\partial y+\cos\theta(2n+\nu)u\partial y \\ =\partial Q-C_p n\partial T-C_p T\log T\partial n \\ -\frac{\partial P}{\rho}=wdw-\sin\theta(2n+\nu)v\partial z-\frac{uu}{r}\partial z+g\partial z \\ =\partial Q-C_p n\partial T-C_p T\log T\partial n. \end{cases}$$

Since, by substituting $v\partial x=u\partial y$, $w\partial x=u\partial z$ and $w\partial y=v\partial z$, the terms in $(2n+\nu)$, the angular velocity of the earth and the atmosphere relative to it, disappear in the summation, they represent a deflecting force at right-angles to the direction of motion at the velocity q, which does not modify the circulation but only the path of motion. The integral, therefore, becomes between two places,

$$(44)\quad \begin{cases} \frac{P_0}{\rho_0}-\frac{P}{\rho}=\frac{1}{2}(q^2-q_0^2)+g(z-z_0) \\ =Q-Q_0-C_p n(T-T_0)-C_p T\log T(n-n_0). \end{cases}$$

It is noted that the term for the circulation $\frac{1}{2}(q^2-q_0^2)$ must be added to the equations of sections I, II, III, IV, to pass from the static state there considered to the circulating state here computed. Since we have

$$(45)\quad g(z-z_0)=-C_p n(T-T_0),\ \text{it follows that}$$

$$(46)\quad \tfrac{1}{2}(q^2-q_0^2)=-C_p T\log T(n-n_0),\ \text{for } Q-Q_0=0,$$

so that the circulation can be computed directly in terms of T and $(n-n_0)$. This proves that the energy of circulation is derived from the difference of temperature gradients in neighboring masses of air, where $n-n_0$ is not equal to zero. Moreover, since the integral of gdz around a closed curve is zero, $\int_0 (gdz)\,ds=0$, and we have the remaining,

$$(47)\quad -\int_0 \frac{dP}{\rho}\cdot ds=\int_0 \frac{dq}{dt}\,ds+\int_0 (gdz)\,ds=\int qdq.$$

This is the equation employed by Bjerknes in his discussion of the circulation of the atmosphere, and is applicable only in *closed curves*, along all points of which P, ρ, q, or qdq must be known by observations. The difficulty of securing such observed data simultaneously along the circuit at a given time is so great that this special case of the general equation will seldom be serviceable. In ordinary meteorology it is required to integrate between the two points, as in the same horizontal plane, or in a vertical direction. Since the term $\frac{1}{2}(q^2-q_0^2)$ is expressed in mechanical measures and represents work done, then it may be taken as equivalent to $\frac{1}{2}(q^2-q_0^2)=g(z'-z'_0)$, so that

$$(48)\quad \tfrac{1}{2}q^2=gz',\ \text{and}\ q^2=2gz'.$$

The circulation is therefore always equivalent to a falling velocity through the height z', which may be computed.

Furthermore, since $Q-Q_0$ is also given in mechanical units, it may be taken as equivalent to

$$(49)\quad Q-Q_0=g(z''-z''_0),\ \text{so that}$$

$$(50)\quad Q=gz''$$

and the stored up energy of radiation is equivalent to a vertical work.

It follows from these considerations that we obtain

$$(51)\quad \begin{cases} q\frac{dq}{dx}=\frac{dQ}{dx}-C_p n\frac{dT}{dx}-C_p T\log T\frac{dn}{dx}, & \text{in latitude.} \\ q\frac{dq}{dy}=\frac{dQ}{dy}-C_p n\frac{dT}{dy}-C_p T\log T\frac{dn}{dy}, & \text{in longitude.} \\ q\frac{dq}{dz}=\frac{dQ}{dz}\qquad\qquad\ \ -C_p T\log T\frac{dn}{dz}, & \text{in vertical.} \end{cases}$$

Since $P=B\rho_m g_0$, we obtain in a stratum of mean ρ,

$$(52)\quad \begin{cases} (B_0-B)=\frac{\rho}{2g_0\rho_m}\left[(q^2-q_0^2)+2g(z-z_0)\right] \\ =\frac{\rho}{2g_0\rho_m}\left[(Q-Q_0)-C_p n(T-T_0)-C_p T\log T(n-n_0)\right] \end{cases}$$

It is readily perceived that the introduction of the factor n and the correlation of the pressure, velocity, gravity, radiation, specific heat, temperature, and gradient, in this double equation leads to an innumerable number of special combinations, taken in connection with the equations of thermodynamics. These embrace the first and second laws of thermodynamics, cyclic processes, the entropy S, the inner energy U, the thermodynamic potentials $(F.\ \Phi)$; the adiabatic, isodynamic, isometric, isothermal physical processes; differential relations with pairs of variables; thermodynamic surfaces and lines in gases; the adiabatic, isodynamic, isenergetic, and isopiestic processes with other variables in pairs; the gaseous, liquid, and solid phases; latent and specific heat; mixtures and chemical transformations, chemical dissociation, their solutions, and other relations, involving ionization, electrical and magnetic fields of force. This vast subject is open to meteorological investigation in the atmosphere, and will no doubt eventually lead to important practical results.

VI. FOUR SYSTEMS OF CONSTANTS FOR THE ATMOSPHERE.

In the application of these formulæ to computations of thermodynamic and dynamic problems in the atmosphere, it will be convenient to have for ready reference a table of the most important constants, with their equivalents in the four systems of units likely to be used. Table 14 presents such a compilation of constants in the following systems of mechanical or gravitational units:

1. Meter-kilogram-second-centigrade degrees.
2. Centimeter-gram-second-centigrade degrees.
3. Meter-gram-second-centigrade degrees.
4. Foot-pound-second-Fahrenheit degrees.

There is often so much confusion in discussing meteorological problems arising from the use of now one system, again another system, and even a hybrid system, that it may be a check against errors for those students who conform to the constants here given. The short formulæ in the first column define the quantities with precision, and the numerous transformations possible among them give rise to many combinations such as occur in various mathematical discussions. Indeed, it is surprising to note how large an amount of current meteorology, occurring in treatises and analytical papers, can be readily reduced to these elementary formulæ, and in reading a new presentation of primary principles it is proper to find whether they conform to these elementary theorems or not. We use the symbols:

TABLE 14.—*Mechanical systems of constants for the atmosphere in gravitational units.*

Formulæ.	S.	° C. Meter-kilogram.	Log.	° C. Centimeter-gram.	Log.	° C. Meter-gram.	Log.	° F. Foot-pound.	Log.
$P_0=g_0\rho_m B_n$	g_0	9.8060	0.99149	980.60	2.99149	9.8060	0.99149	32.172	1.50748
	ρ_m	13595.8	4.13340	13.5958	1.13340	13.5958	1.13340	846.728	2.92774
	B_n	0.760	9.88081	76.0	1.88081	0.760	9.88081	2.4934	0.39680
	P_0	101323.5	5.00571	1013235.	6.00571	101.3235	2.00571	67923.5	4.83202
$P_0=g_0\rho_0 l_0$	g_0	9.8060	0.99149	980.60	2.99149	9.8060	0.99149	32.172	1.50748
	ρ_0	1.29305	0.11162	0.00129305	7.11162	0.00129305	7.11162	0.080529	8.90595
	l_0	7991.04	3.90260	7991.04	5.90260	7991.04	3.90260	26217.3	4.41859
	P_0	101323.5	5.00571	1013235.	6.00571	101.3235	2.00571	67923.5	4.83202
$P_0=R_0T_0\rho_0$	R_0	287.0334	2.45793	2870334.	6.45793	29.2712	1.46644	1716.43	3.23463
$=F\frac{C_p}{g_0}$	T_0	273.	2.43616	273.	2.43616	273.	2.43616	491.4	2.69144
$=-F\frac{dh}{dT}$	ρ_0	1.29305	0.11162	0.00129305	7.11162	0.0012935	7.11162	0.080529	8.90595
	P_0	101323.5	5.00571	101323.5	6.00571	101.3235	2.00571	67923.5	4.83202
$p_0=P_0/g_0$	p_0	10332.8	4.01422	1033.28	3.01422	10.3328	1.01422	2111.23	3.32454
$C_p=\frac{k}{k-1}\frac{l_0}{T_0}g_0$	$\frac{k}{k-1}$	3.461545	0.53927	3.461545	0.53927	3.461545	0.53927	3.461545	0.53927
$=\frac{k}{k-1}R$	l_0	7991.04	3.90260	799104.	5.90260	7991.04	3.90260	26217.3	4.41859
$=\frac{g_0P_0}{F}$	g_0	9.8060	0.99149	980.60	2.99149	9.8060	0.99149	32.172	1.50748
$=-g_0\frac{dh}{dT}$	$\frac{1}{T_0}$	$\frac{1}{273}$	7.56384	$\frac{1}{273}$	7.56384	$\frac{1}{273}$	7.56384	$\frac{1}{491.4}$	7.30856
	C_p	993.5787	2.99720	9935787.	6.99720	993.5787	2.99720	5941.57	3.77390
$R_0=\frac{l_0}{T_0}g_o$	l_0	7991.04	3.90260	799104.	5.90260	7991.04	3.90260	26217.3	4.41859
$=\frac{B_n\rho_m}{T_0\rho_0}g_0$	g_0	9.8060	0.99149	980.60	2.99149	9.8060	0.99149	32.172	1.50748
$=\frac{P_0}{\rho_0 T_0}$	$\frac{1}{T_0}$	$\frac{1}{273}$	7.56384	$\frac{1}{273}$	7.56384	$\frac{1}{273}$	7.56384	$\frac{1}{491.4}$	7.30856
	R_0	287.0334	2.45793	2870334.	6.45793	287.0334	2.45793	1716.43	3.23463
$C_v=C_p-R_0$	C_v	706.5453	2.84914	7065453.	6.84914	706.5453	2.84914	4225.14	3.62584
$k=\frac{C_p}{C_v}$	k	1.4062486	0.14806	1.4062486	0.14806	1.4062486	0.14806	1.4062486	0.14806
	$k-1$	0.4062486	9.60879	0.4062486	9.60879	0.4062486	9.60879	0.4062486	9.60879
	$\frac{k}{k-1}$	3.461545	0.53927	3.461545	0.53927	3.461545	0.53927	3.461545	0.53927
	$\frac{1}{k-1}$	2.461545	0.39121	2.461545	0.39121	2.461545	0.39121	2.461545	0.39121
$-\frac{dT}{dh}=\frac{g_0}{C_p}$	$-\frac{dT}{dh}$	0.0098695	7.99429	0.000098695	5.99429	0.0098695	7.99429	0.0054147	7.73358
$\frac{1}{A_m}=\frac{g_0}{A}$	$\frac{1}{A_m}$	4185.57	3.62175	41855700.	7.62175	4185.57	3.62175	25027.7	4.39842
$A_m=\frac{A}{g_0}$	A_m	0.0002389	6.37829	2.389×10^{-8}	2.37829	0.0002389	6.37829	0.00003995	5.60158
Pr. Th. U.	Θ							3.968	0.59856
	F	1000.	3.00000	100	2.00000	1	0.00000	367.8	2.56560
	A	0.002343	7.36978	2.343×10^{-5}	5.36978	0.002343	7.36978	0.0012855	7.10906
	$\frac{1}{A}$	426.837	2.63022	42683.7	4.63022	426.837	2.63022	777.9	2.89094

P_0 = pressure in units of force, g_0.
ρ_n = the weight of a given mass of atmosphere, $\rho_m B_n = \rho_0 l_0$.
C_p = the specific heat at constant pressure.
C_v = the specific heat at constant volume.

$R = C_p - C_v, \qquad k = \frac{C_p}{C_v}$

$-\frac{dT}{dh}$ = the temperature fall per unit height in adiabatic state.

$\frac{1}{A}$ = the mechanical equivalent of heat, 426.8 and 777.9.

$\frac{g_0}{A}$ = the factor to change mechanical units to heat units.

F = the factor connecting the thermal gradient and P_0.
θ = the number of British thermal units in 1 kilogram-degree.

VII. THE THERMODYNAMIC CONSTANTS FOR THE SUN.

There is much difficulty in passing from the thermodynamic conditions on the earth to the corresponding thermodynamic conditions on the sun. I have already approached this subject from the side of radiation in my "Eclipse Meteorology and Allied Problems," 1902, and from the method of Nipher's Formulæ, in my studies on the "Circulation of the Atmospheres of the Sun and of the Earth," 1904. I shall briefly present the same subject as the immediate development of the fundamental formulæ introduced in this paper. It is not so difficult to produce a self-consistent system of quantities as it is to find one which conforms to the actual physical state of the sun, and I conceive that it is proper to discuss this subject in several ways.

Specific heat.

From the preceding formulæ, we have,

(53) $-\frac{dT}{dz} = \frac{g_0}{C_p} = \frac{F}{P_0} = \frac{F}{g_0 \rho_m B_n} = \frac{F}{g_0 \rho_0 l_0}$. Hence,

(54) $C_p = \frac{\rho_m B_n}{F} \cdot g_0^2 = \frac{\rho_0 l_0}{F} \cdot g_0^2$.

Since $\rho_m B_n = \rho_0 l_0$ is a given mass, and F is constant for a given system of units, it follows that C_p is proportional to the square of the gravity. Taking the force of gravity on the sun,

(55) $(g)_{sun} = g_0 \times G = 9.806 \times 28.028 = 274.843$

it follows that the specific heat on the sun is

(56) (C_p) sun $= C_p \times G^2 = 993.5787 \times (28.028)^2 = 780524$.

Adiabatic rate of temperature-fall.

(57) For the earth $-\frac{dT}{dz} = \frac{g_0}{C_p} = 9.8695°$ per 1000 meters.

(58) For the sun $-\left(\frac{dT}{dz}\right)_{sun} = \frac{g_0 G}{C_p G^2} = \frac{9.8695°}{28.028} = 0.32862°$.

Mechanical equivalent of heat.

(59) From $-\frac{dT}{dz} = \frac{g_0}{C_p}$ for the earth, we have on the sun,

(60) $-\frac{dT}{G dz} = \frac{g_0 G}{C_p G^2}$. Hence, by integration,

(61) $-C_p G^2 \int dT = g_0 G \int G dz$, or,

(62) $-C_p G^2 (T - T_0) = g_0 G (z - z_0)$.

If the change of temperature is 1° then,

(63) $-C_p G^2 = g_0 G (z - z_0) G$,

is the mechanical equivalent of heat, and is obtained by the fall of a mass through the height $(z - z_0) G$ under the force of gravity $g_0 G$. Whereas on the earth,

(64) $\frac{1}{A_m} = 4185.57 = 426.8 \times 9.8060$, we have

(65) $\left(\frac{1}{A_m}\right)_{sun} = 4185.57 \times (28.028)^2 = 3288046$.

Boyle-Gay-Lussac Law.

From the formulæ of Table 14, we have,

(66) $g_0 l_0 = \frac{P_0}{\rho_0} = R T_0 = C_p T_0 \frac{k-1}{k} = -g_0 \frac{dh}{dT} T_0 \frac{k-1}{k}$,

on the earth, and we infer that we shall have on the sun,

(67) $g_0 G \cdot l_0 G^2 = \frac{P_0 G^3}{\rho_0} = R G^2 \cdot T_0 G = C_p G^2 \cdot T_0 G$

$= -g_0 G \cdot \frac{dh}{dT} G \cdot T_0 G \frac{k-1}{k}$. Hence,

(68) $l_0 G^2 = 7991.04 \times (28.028)^2$.
(69) $P_0 G^3 = 101323.5 \times (28.028)^3$.
(70) $R G^2 = 287.0334 \times (28.028)^2$.
(71) $T_0 G = 273° \times 28.028 = 7652°$,

if $\frac{k-1}{k}$ is retained a constant in both cases.

If the atmosphere of the sun is composed of some other material than ρ_0 of the earth's atmosphere, then the proper modification of the preceding quantities can be readily computed from terrestrial data.

Specific heat at constant volume.

For the earth, $C_v = C_p - R$, and hence, for the sun,

(72) $C_v G^2 = C_p G^2 - R G^2$

(73) $(C_v)_{sun} = C_v G^2 = 706.5453 \times (28.028)^2 = 555040$.

(74) Finally, $k = \frac{C_p \cdot G^2}{C_v \cdot G^2} = 1.4062486$, as a check.

This system throws the entire emphasis upon a change of gravity depending upon the mass of the central body, rather than upon the change of physical conditions implied in altering the ratio of the specific heats k. Since the temperature of the photosphere may in this way be taken as about 7652°, and the temperature gradient —0.32862° per 1000 meters, it follows that the effective temperature of radiation as determined by bolometer measures, 6100°, will be reached at the height of 4418 kilometers, or 2745 miles above the surface of the photosphere. This change of 1552° may be sufficient to meet the requirements of the spectroscopic observations in regard to the absorption and reversal of the spectrum lines. The gradient, —0.32862° per 1000 meters, is 28.028 times greater than that obtained by my other methods, the difference arising from the different distribution of the gravity factor G, which seems to be fully accounted for in these formulæ.

GERMAN AERIAL RESEARCH STATION.

According to Science (April 6, 1906, p. 559), the German Government has decided to establish a meteorological station on Lake Constance, near Friedrichshafen. It will cost $15,000, the states of Bavaria, Wurttemberg, Baden, and Alsace-Lorraine joining in the expense. Extensive study of the atmosphere will be made daily by means of kites flown from specially constructed boats on the lake. Similar kite and balloon stations already exist in northern Germany, at Lindenberg and Hamburg, and plans are being made to erect still another station in the northeastern part of the Empire.

A NEW DEPARTURE IN FORECASTING.

The following statement has been sent by the Chief of Bureau in reply to a recent letter, requesting some details regarding the "new departure in forecasting weather conditions a month in advance:"

Beyond the statement made by me in New York, in March, that the Weather Bureau believes that it is in possession of a sound scientific basis on which to make forecasts for a considerable period in advance, nothing will be announced in regard to the matter for several months to come.

ATMOSPHERIC EFFECTS IN ASTRONOMICAL OBSERVATIONS.

It is well known that the study of the twinkling or scintillation of the stars, as also the study of the so-called shadow bands accompanying total solar eclipses, has given us the means of measuring the sizes and motions of the little masses of warm and cold air of which the atmosphere is a mixture; so also the study of dust whirls and of the alternations of temperature in the foehn wind has given us some idea of the mixture of the larger masses of ascending warm and descending cool air. The delicate photographic work of Prof. Percival Lowell and his assistants, of the Flagstaff Observatory, has brought out another optical effect in the atmosphere, due to the presence of quite regular alternations of refraction, which may be spoken of as optical waves. These irregularities may be produced either by alternations of pressure, as in sound waves, or by alternations of temperature and moisture; or again they may be conceived of as gravity waves on an otherwise horizontal surface, separating layers of air of different density. Every astronomical observatory is troubled by the irregularities of refraction in the atmosphere above it. In a perfectly still, clear night, when cool air gathers round the observatory, there is some upper boundary surface near by along which air is flowing, perhaps gently, or, it may be, very rapidly, and in this boundary region waves and curls like breakers and mixtures are continually occurring. A beam of light passing through such a mixture down to the telescope and examined with a high magnifying power is seen to be in continual oscillation about an average position, and the eye recognizes this motion as such; but if a photographic plate be substituted for the eye, the varying positions of the moving image, being superposed upon each other, are all recorded permanently, so that the sensitive plate shows a large blurred image instead of a definite point; therefore we measure from the center of this image as representing approximately the location of the sharp point that we would have preferred to photograph. If we attempt to photograph a delicate line in the spectrum of any celestial body, we find that it also is blurred, or, as we say, broadened, rather than narrow and sharp. Similarly the narrow bands or markings on the planet Mars, called canals, which have been the special study of Professor Lowell, may appear blurred and indefinite when photographed, although in favorable momentary glances the eye may recognize the fact that they are very narrow and sharp. But illusions occur even in these momentary glances, since we are looking through an atmosphere composed of something similar to prisms or lenses of warm and cold air, which may appreciably distort the truth. In other words, we are observing and photographing images due to diffraction, and it is only by studying the laws of diffraction that the astronomer learns to interpret what he sees and deduces the true characteristics of the celestial bodies, while the meteorologist deduces the nature of our atmospheric peculiarities.

These diffraction phenomena have been studied both experimentally and theoretically. One of the finest examples of experimental work is the famous and rather rare volume by Schwerd, on "beugung," or diffraction phenomena in telescopes. A more recent experimental and theoretical work is that by Hermann Struve, with especial application to the semicircular objective of the heliometer. The study of the diffraction phenomena in microscopy, by the late Professor Ernst Abbe, of Jena, led to all his famous improvements in optical instruments. American students who are familiar with the series of works published by Prof. W. H. C. Bartlett, of West Point, will have acquired a good ground work for the prosecution of studies in diffraction, or the interference of waves of all kinds. But most complete theoretical and historical expositions of the subject will be found in a volume published in Cambridge, Eng., in 1904, viz, "The Analytical Theory of Light," by James Walker, Demonstrator of Physics in the Clarendon Laboratory, Oxford, and again in the more recent "Physical Optics" of Prof. R. W. Wood, New York, 1905. Here we find the general formula for the diffraction patterns produced by apertures of any special form, and by light of any given wave-length or complexity. In order to resolve the markings on a minute microscopic object, or separate the close components of a double star, or perceive the delicate markings on a planetary surface, without being misled by diffraction phenomena, certain instrumental conditions must be fulfilled; such, for instance, as that mentioned on page 126 of Walker's treatise, namely that "the angular interval between the lines or markings on the object must exceed the angle subtended by the wave-length of light at a distance equal to the diameter of the circular aperture," namely the aperture of the object glass, if a telescope or microscope be used. The same law is given at page 190 of Wood's "Physical Optics."

On page 265, Mr. Walker demonstrates that when a telescope is focussed on a narrow line of monochromatic light [analogous to the canals of Mars] and the object glass is limited to a slit parallel to this line [analogous to the atmospheric lenses that Professor Lowell calls waves], the geometrical image of the line is bordered by a system of diffraction fringes; on covering one-half of the slit with a retarding plate, the bands of an odd order are shifted toward the side of the retarded stream [analogous to the effect of a rapid succession of atmospheric waves and also analogous to the effect produced by the movable spider-line of the micrometer when one attempts accurate measurement].

In this study of diffraction phenomena, Professor Lowell has made an important advance, as explained in an article by him in the Proceedings of the Royal Society, published February 8, 1906, page 132. By many experiments and measurements he found:

> The so-called air waves were detrimental in two ways, depending upon their size relative to the diameter of the object glass. They are made up of trains of waves, of condensation and rarefaction, and if the distance from crest to hollow be equal to the diameter of the object glass the train will produce a series of bodily oscillations of the whole image in the field of view. If, however, the wave-length be shorter than this, partitive motion occurs, while the bodily motion is reduced, the result being that we have an apparently steady image, but a blurring and finally a complete obliteration of the delicate detail. * * * The image often appears to be perfectly shown, and yet discloses either no fine detail or else shows such only in a blurred and indefinite condition. This is the reason that the canals are often reported to be streaks, whereas under better atmospheric conditions, namely when the relatively small waves are absent, they appear as they really are, very narrow dark lines. The other aspect is produced by the blurring tremor of the air waves, the real image of the canal being thus spread out, and consequently diffused. The larger the glass the more likely is this state of confused illusion to occur, a knowledge of which suggested to us the diaphragming down of the 24-inch objective, with a result which was truly surprising. It was found very rare that the definition was not improved by this artifice. The same device was next applied to photography, and the camera entirely corroborated the evidence of the eye.

In securing the photographs published by Lowell with this article, the objective was diaphragmed down to suit the particular atmospheric wave currents traveling at the moment in front of the telescope. Side by side with Lowell's photographic prints are reproductions of his hand drawings, made independently of the photographs, but at the same time.

The sizes and movements of these atmospheric waves will form an interesting subject for the study of meteorologists. In general, however, we can at present see no way by which to determine the distances of the atmospheric irregularities from the observer, their altitude above him, or their special nature, whether due to temperature, pressure, or wave-motion between boundary surfaces. In any case, however, they give rise to phenomena of diffraction, or the interference of nearly parallel rays of light.

It may also be questioned whether some of the color phenomena seen on the disks of the planets, especially Jupiter

and Saturn, may not also be diffraction phenomena originating in their own moist atmospheres, just as halos and other colored beams originate in the earth's atmosphere. The changes of tint on the surfaces of the clouds of Jupiter and Saturn occur at certain angular distances from the sun and earth, such as to make this suggestion worthy of special study. The elaborate works of Mascart, Pernter, and others on this subject must be studied by those who would go into precise details.—*C. A.*

THE EIGHTH INTERNATIONAL GEOGRAPHIC CONGRESS.

The report of the Eighth International Geographic Congress, held in the United States in 1904, has recently been published by the Government as Document No. 460, House of Representatives, 58th Congress, 3d session, Washington, 1905. In its wealth of geographic papers we find the following articles bearing directly upon meteorology:

Pages 246-265. Meteorological summary for Agaña, island of Guam, for the year 1902. By Dr. Cleveland Abbe, jr., of the U. S. Geological Survey.

Pages 266-271. A climatological dictionary for the United States. By Prof. A. J. Henry.

Pages 272-276. Scientific work of Mount Weather Meteorological Observatory. By Prof. F. H. Bigelow.

Pages 277-293. Suggestions concerning a more rational treatment of climatology. By Prof. R. DeC. Ward.

Pages 294-307. The Canadian climate. By Prof. R. F. Stupart.

Pages 308-321. The climate of Kimberley. By J. R. Sutton.

Page 322. A project for the exploration of the atmosphere over the tropical oceans. By A. Lawrence Rotch.

Pages 323-327. Antarctic meteorology and international cooperation in polar work. By Henryk Arctowski.

Pages 328-339. De la prédominance des tourbillons, en sens inverse des aiguilles d'une montre, dans les cours d'eau de l'Europe centrale et occidentale. By Jean Brunhes.

Pages 340-342. Rainfall with altitude in England and Wales. By William Marriott.

Pages 343-347. Climatology of the lowlands and watershed terraces of Natal. By Frederick W. D'Evelyn.

Pages 348-351. Aerostation associated with the study of geography. By E. V. Boulanger.

Pages 352-379. Climate of Pamplemousses, in the island of Mauritius. By T. F. Claxton.

Pages 380-385. Climate of Ts'aidam, in eastern Tibet. By A. Kaminski.

Pages 386-392. Meteorology of Western Australia. By W. Ernest Cooke.

Pages 393-396. On the unsymmetrical distribution of rainfall about the path of a barometric depression crossing the British Isles. By Hugh Robert Mill.

Pages 397-406. Evidences of land near the North Pole. R. A. Harris.

Pages 408-424. (In German.) Winds and ocean currents. By E. Witte.

Pages 465-467. (In German.) Vertical motions of the earth observed by the trifilar gravimeter. By Dr. A. Schmidt.

Pages 468-477. (In German.) The foundation, organization, and problems of the International Seismological Association. By Dr. G. Gerland.

Pages 535-540. The form of the geoid, as determined by measurements in the United States. By John F. Hayford.

Pages 664-670. Climate and cult. By J. Walter Fewkes.

Pages 711-714. Color in the north and south polar regions. By Frank Wilbert Stokes.

Pages 737-740. The scientific results of the Russian expedition to Kham. By Capt. P. Kozloff.

Each of the items in the above list is worthy of a fuller abstract than we can give it. The volume can be easily obtained by application to any member of Congress, and should be in the hands of every teacher and special student.—*C. A.*

THE LEGITIMATE LINE OF DUTY.

During the month of March the Weather Bureau and other branches of the Department of Agriculture received from correspondents in several different States requests for authoritative replies to various questions which turned out to be identically the same, and many of which did not relate to the work of the Department of Agriculture. In some cases the questions came from teachers or scholars, in others from the cooperative observers of the Weather Bureau. Our first temptation to answer these questions, as a kindness to our correspondents, was quickly modified by the consideration that as these all had a common origin they very probably related to some competitive or other civil service examination, with which it was improper for a Government bureau to interfere. Therefore in some cases the questions were not answered.

On further inquiry, however, the Editor discovered that these 27 questions emanated from a very enterprising manufacturer of pianos, or his business agent, who took this method of advertising his pianos. It is not often that the United States Government is made a party to any such advertising scheme, and it is earnestly to be hoped that in future struggles for a prize no observer or correspondent of the Weather Bureau will again attempt to enlist its kind offices.

Several cases have come to the Editor's knowledge during the past twenty years in which Government officials have been requested to act as umpires or give authoritative decisions as to points under discussion. The Government was not established for any such purpose as this, and such correspondence will always remain unanswered as being outside our legitimate line of duty.—*C. A.*

THE TORNADO AT MERIDIAN, MISS., MARCH 2, 1906.

By LEE A. DENSON, Observer, Weather Bureau. [Extract from Form 1014 A.]

The tornado that visited Meridian on the evening of March 2 was the most destructive local disturbance ever observed in eastern Mississippi. Twenty-three people were killed, and it is estimated that the loss of property damaged or destroyed is about $400,000.

The sky had been cloudy all day and occasional light showers occurred, the temperature being above normal, with maximum, 69° F., shortly after noon. A fresh breeze from the south and southeast prevailed, in connection with a large barometric depression that was moving eastward across the central portion of the country, but notwithstanding the breeze the atmosphere became oppressive and toward evening a heavy bank of dark strato-cumulus clouds was observed in the southwest, from the front of which occasional small streaks of lightning issued. Distant rumbling thunder was heard at 5:40 p. m. At 6 p. m. the clouds had assumed a very threatening aspect and rain began to fall at 6:05. There were frequent flashes of sheet lightning. About 6:20 p. m. a sound resembling the noise made by a fast moving freight train came from the southwest. The sound became louder and louder, attaining a terrific roar for a minute as the disturbance passed. All was quiet again at 6:30 p. m. The center of the storm passed 250 yards south of the local office of the Weather Bureau, moving a little north of east, at 6:26 to 6:27 p. m. The barograph pen dipped sixteen hundredths of an inch and recovered immediately (see fig. 1); the temperature fell only 2° F. and recovered 1° F. within 10 minutes. At 6:15 p. m. the velocity of the wind was only 9 miles from the southeast; at 6:20 it was 16 east, backing to northeast at 6:22 and returning to east at 6:23 and to southwest a minute later when there was a marked increase in the velocity, the direction being south at 6:25, east at 6:26, and west at 6:27 p. m. The greatest velocity recorded was 64 miles from the east, as the storm passed. Immediately afterward the rate diminished to 36 from the west and 5 minutes later it was 12 miles from the southwest. This record clearly shows the inward rush of air toward the center of the storm.

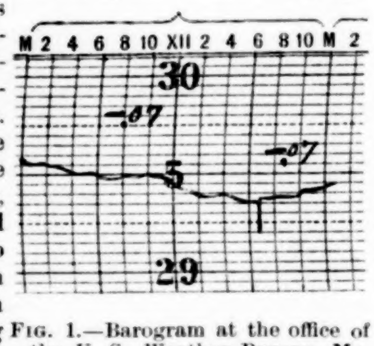


FIG. 1.—Barogram at the office of the U. S. Weather Bureau, Meridian, Miss., March 2, 1906.

The following description has been carefully compiled from the reports of a number of reliable witnesses who observed the storm from points within 100 yards of the track:

A funnel-shaped, bounding cloud seemed to rise and fall with a darting, irregular forward movement. The lower end of the funnel reached within ten feet of the ground and appeared to be not more than six inches in diameter at a distance of 100 yards, but the upper portion was much larger. Many streaks of lightning were working inside like snakes of fire. The funnel appeared to be open at the top and a distinct glow was cast upward.

Several persons on both the north and south sides of the path state that they saw "small balls of fire" thrown out of the front and sides of the funnel, but none were observed in the rear. It should be stated that many small houses were destroyed in which large fireplaces were used. It may be that the "balls of fire" were due to burning débris lifted up and thrown off by the storm.

Light rain continued at intervals until 8:15 p. m., and again from 9:25 p. m. to 10:00 p. m. No hail was observed here, but hail was observed three miles southwest of the station. The temperature fell gradually during the night and the relative humidity the following morning was 53, an unusually low percentage for this section.

The path of the tornado was traced about eleven miles. Its average width was 150 yards, but the width wherein buildings were destroyed and trees uprooted in large numbers was not over 100 yards, except at a few places. The general direction was east-northeasterly, with slight variations from a straight course. Beginning at a point about seven miles southwest of Meridian the disturbance damaged and uprooted trees along a path 100 to 200 yards wide for one mile. It then lifted and was observed a mile west of Arundel Springs, in the form of a dark cloud moving northeastward. The first building destroyed was a barn one mile west-southwest of Meridian. From this point the path was practically continuous, though some property was only slightly injured, while other buildings were completely demolished. Approaching the city the cloud assumed a distinct funnel shape, and curved slightly eastward, damaging and destroying many small houses in that quarter of the town known as Fewell's Survey; turning slightly to the northward, it moved along and gradually crossed the New Orleans and Northeastern and the Alabama and Vicksburg railroad tracks, and unroofed the building of the Meridian Light and Power Company, thereby cutting off the electric light current. Here also the gas tank was raised momentarily; this had the effect of putting out the gas lights for about ten minutes. Moving eastward the tornado destroyed a freight depot, unroofed several buildings, and then reached the point of greatest destruction, completely demolishing every building in two blocks; but on reaching Lindley Hill the storm turned northeastward across Georgetown, and was traced beyond the city limits east-northeastward for two miles, where the path spread to half a mile and gradually disappeared.

[Extract from New Orleans Times-Democrat, March 4, 1906.]

Following a drizzling rain all during Friday afternoon, a premature darkness settled over Meridian shortly after 6 o'clock. * * * As described by eyewitnesses, the storm assumed the appearance of a lofty ball of fire as it swept along its pathway of destruction.

Meehan Junction, the first place damaged, is twelve miles southwest of the city. * * * The storm next struck the fertilizer plant, just below the city limits. * * *

In describing the storm it is said:

There was a great roaring like that made by a locomotive under heavy steam pressure and then came a shock like the meeting of heavy trains. Those on the outside claim that a cone of fire or "red glow" filled the center of the tornado, and all claim that the point of the inverted cone was so small and sharp that it could not have covered the full path of destruction.

An eyewitness says:

There was all the stillness and calm that precedes one of these horrible freaks of the elements. The humidity became almost unbearable. * * * A fine, drizzling rain prevailed during the day at Meridian. Late in the afternoon dark clouds hovered around the city and the humidity at times was rather severe. Shortly after 6:15 o'clock a terrible looking cloud could be observed bounding out of the southwestern horizon toward the city. This was followed by a downpour of rain; then with a rush and noise that struck terror, the tornado descended upon that portion of the city near the passenger depot.

RECENT ADDITIONS TO THE WEATHER BUREAU LIBRARY.

H. H. Kimball, Librarian.

The following titles have been selected from among the books recently received, as representing those most likely to be useful to Weather Bureau officials in their meteorological work and studies. Most of them can be loaned for a limited time to officials and employees who make application for them.

Aachen. Meteorologisches Observatorium.
Deutsches Meteorologisches Jahrbuch. 1904. 76 pp. f°. Karlsruhe. 1906.

Agemennone, Giovanni.
La registrazione dei terremoti. 136 pp. 8°. Roma. 1906.

Arrhenius, Svante.
Die vermütliche Ursache der Klimaschwankungen. 10 pp. 8°. Uppsala. 1906.

Bulgaria. Central Meteorological Institute.
Tremblements de terre en Bulgarie. No. 5...1904. viii, 283 pp. 8°. Sofia. 1905.

Coblentz, William W[eber].
Investigations of the infra-red spectra. v, 330 pp. 8°. Washington. 1905.

Conseil Permanent International pour l'Exploration de la Mer.
Einfluss des Windes auf die Dichte und die Bewegung des Meereswassers von J. W. Sandström. (Publications de circonstance No. 18.) 6 pp. f°. Copenhague. 1904.
Oberflächentemperaturmessungen in der Nordsee ... von E. van Everdingen und C. H. Wind. (Publications de circonstance No. 14.) 10 pp. 4°. Copenhague. 1904.
On the influence of the east Icelandic polar stream on the climatic changes of the Faroe Isles, the Shetlands and the north of Scotland. By Martin Knudsen. (General report on the work of the period July, 1902–July, 1904. Rapports et procès-verbaux. Vol. III. Edition anglaise. Appendix C.) 8 pp. f°. Copenhague. 1905.
On the probable occurrence in the Atlantic current of variations, periodical and otherwise, and their bearing on meteorological and biological phenomena, with an introduction by Otto Pettersson. (General report on the work of the period July, 1902–July, 1904. Appendix A.) x, 26 pp. f°. Copenhague. 1905.

Coimbra. Observatorio Meteorologico.
Observacoes meteorologicas et magneticas...1901. viii, 152 pp. f°. Coimbra. 1906.

Eiffel, G[ustave].
Étude comparée des stations météorologiques de Beaulieu-sur-Mer (Alpes-Maritimes) Sèvres (Seine-et-Oise), Vacquey (Gironde) pour l'année 1904. vii, 156 pp. f°. Paris. 1905.
Same. Atlas des planches. 12 plates. f°. Paris. 1905.
Types généraux de comparaisons météorologiques appliqués a l'étude des stations de Beaulieu-sur-Mer (Alpes-Maritimes) Sèvres (près Paris) et Vacquey (Gironde) pour l'année 1905 (Premier semestre). 71 pp. f°. Paris. 1905.

Flammarion, Camille.
Thunder and lightning. Translated by Walter Mostyn. 281 pp. 8°. Boston. 1906.

Greenwich. Royal Observatory.
Results of the magnetical and meteorological observations. 1903 v. p. f°. Edinburgh. 1904.

India. Meteorological Department.
Rainfall of India. 1904. v. p. f°. Calcutta. 1905.

Kharkov. University. Meteorological Observatory.
Résults des observations...1902. [Russian and French text.] 131 pp. 8° Kharkof. 1905.

Pittman, Philip.
The present state of the European settlements on the Mississippi... An exact reprint of the original edition, London, 1770; edited, with introduction, notes, and index, by Frank Heywood Hodder. 165 pp. 8°. Cleveland. 1906.

Royal Society of Edinburgh.
Proceedings. Vol. XXIV. Sessions 1901-2, 1902-3. viii, 667 pp. 8°. Edinburgh. 1904.
Same. Vol. XXV. Sessions 1903-4, 1904-5. 1905. viii, 1259 pp. 8°. Edinburgh. 1906.

Transactions. Vol. XLI. Parts I and II. Sessions 1903-4, 1904-5. 469 pp. 4°. Edinburgh. 1904.
Same. Vol. XLIII. Meteorology of the Ben Nevis observatories. Part III. 564 pp, 4°. Edinburgh. 1905.

Regensnetz in Liv-, Est-und Kurland.
Bericht über die Ergebnisse der Beobachtungen . . . 42 pp. 8°. [Yuriev. 1905.]

Saxony. Königliches Sachsisches Meteorologisches Institut.
Deutsches meteorologisches Jahrbuch für 1901. (94), 172 pp. 4°. Chemnitz. 1905.

St. Petersburg. Imperial Forestry Institute. Meteorological Observatory.
Observations 1904. [Russian and French text.] iv, 37 pp. f°. St. Petersburg. 1905.

Smithsonian Institution.
Report of the United States National Museum. xvi, 780 pp. 8°. Washington, 1906.

Vincent, A.
A propos du concours de prévision du temps de Liége. 3 pp. 8°. Bruxelles. 1906.

Württemburg. Königliches Meteorologisches Zentral Station.
Deutsches meteorologisches Jahrbuch. 1902. 58 pp. f°. Stuttgart. 1905.

Yuriev. University. Meteorological Obs rvatory.
Meteorologische Beobachtungen . . . 1904. 134 pp. 8°. Yuriev. 1905.

Zi-ka-wei. Observatoire Météorologique, Magnetique et Sismologique.
Reduction des observations de temperature 1873-1903. xi, 56 pp. f°. Chang-hai. 1905.

RECENT PAPERS BEARING ON METEOROLOGY.

H. H. KIMBALL, Librarian.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the Library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau. Unsigned articles are indicated by a ——

London, Edinburgh, and Dublin Philosophical Magazine. 6th Series. Vol. 11. Apr., 1906.
Bragg, W. H. On the recombination of ions in air and other gases. Pp. 466-484.

Popular Astronomy. Northfield, Minn. Vol. 14.
Maunder, Edward Walter. The solar origin of terrestrial magnetic disturbances. Pp. 228-238.

Proceedings of the Royal Institution of Great Britain. London. Vol. 17, pt. 3.
S[haw], W[illiam] N[apier]. Some aspects of modern weather forecasting. [Abstract.] Pp. 246-247.

Scientific American. New York. Vol. 94. Mar. 24, 1906.
—— The duration of lightning flashes. Pp. 246-247.
—— Some recent foreign flying machines. Pp. 252-253.

Scientific American Supplement. New York. Vol. 61. Apr. 21, 1906.
McAdie, Alexander. Lightning and the electricity of the air. Pp. 25332-25334.

Symons's Meteorological Magazine. London. Vol. 41. Mar., 1906.
Rambaut, Arthur A. The green flash on the horizon. Pp. 21-23.
Dines, W. H. A recording anemometer for kites. Pp. 24-26.
Bonacina, L. C. W. Localization of snow on the Surrey Hills, on February 24, 1906. [Distribution of snow covering in relation to the nature of the subjacent soil.] Pp. 28-29.

Transactions of the Royal Society of Edinburgh. Edinburgh. Vol. 40, pt. 3.
Mossman, R[obert] C[ockburn]. The meteorology of Edinburgh. Pp. 469-509.

Annuaire de la Société Météorologique de France. Paris. 54 année. Fév., 1906.
Angot, Alfred. Règle pour le calcul de l'humidité atmospherique. Pp. 50-57.
Eiffel, G[ustave]. Mesures thermométriques en météorologie. Pp. 57-61.
Angot, Alfred. Remarques au sujet de la note de M. Eiffel. Pp. 61-64.
Rivière, Ch. La pluie a Alger d'aprés les observations faites au Jardin d'Essai de 1868-1905. Pp. 68-71.

Archives des Sciences Physiques et Naturelles. Genève. 4 période. Tome 21.
Dufour, Henri and Raoul, Gautier. Les ombres volantes. Pp. 196-201.

Bulletin de la Société Belge d'Astronomie. Bruxelles. 11 année. Fev., 1906.
Brunhes, Bernard. Rapport sur le concours de prévision du temps, organisé par la Société Belge d'Astronomie en 1905. Pp. 57-77.
Guilbert, Gabriel. Principes de prévision du temps. Pp. 77-81.
Guarini, E. Sur l'électricité. [Projects for utilizing electrical discharges in the atmosphere.] Pp. 96-98.

Bulletin de la Société Belge d'Astronomie. Bruxelles. 11 année. Mars, 1906.
Durand-Gréville, E. Concours de prévision du temps. Pp. 117-125.
F., A. Le poids d'un flacon de neige. Pp. 150-151.

Ciel et Terre. Bruxelles. 27 année. 1 Mars, 1906.
—— Photographies d'aurores boréales et de leur spectre. [Note on work by J. Sykora.] Pp. 22-23.

Ciel et Terre. Bruxelles. 27 année. 16 Mars, 1906.
Teisserenc de Bort, L[eon]. Quelques des problémes actuels de la météorologie. Pp. 32-40.

Ciel et Terre. Bruxelles. 27 année. 1 Avril, 1906.
Rahir, Edm. Étude thermométrique de la grotte de Remouchamps. Pp. 59-73.

Revue Néphologique. Mons. Mars, 1906.
Bracke, E. La brume et les nuages. Pp. 17-19.

Beiblätter zu den Annalen der Physik. Leipzig. Band 30. 1906. Probebogen.
Eb[ert], H. Ueber die hydrodynamische Theorie der seiches. [Abstract of article by Chrystal.] P. 14.

Gaea. Leipzig. 42 Jahrgang. Mai, 1906.
Götz, W. Fortschreitende Aenderung in der Bodendurchfeuchtung. Pp. 270-281.
—— Magnetische Wirkungen des Blitzes auf vulkanische Gesteine. Pp. 312-313.

Meteorologische Zeitschrift. Braunschweig. Band 23. März, 1906.
Hann, Julius. Meteorologie des Nordpolarbassins. [Abstract of work by Mohn.] Pp. 97-114.
Lüdeling, G. Ueber die Registrierungen des luftelektrischen Potentialgefälles in Potsdam im Jahre 1904. Pp. 114-121.
M. Möller. Ueber Cirruswolken. Der Cirrusschopf am Ballengewölk. Pp. 122-126.
Sapper, Karl. Regenmessungen in der Republik Guatemala 1904. Pp. 127-129.
—— Stewart über das Klima von Südafrika. P. 130.
—— Meteorologische Beobachtungen zu Lagos. P. 133.
—— Resultate der meteorologischen Beobachtungen zu Alt-Calabar im Jahre 1902. Pp. 133-134.
—— Prohaska: Ueber die jährliche und tägliche Periode der Gewitter und Hagelfälle in Steiermark, Kärnten und Krain. Pp. 134-137.
—— Gewitter in Sachsen-Altenburg. P. 139.
—— Meteorologische Beobachtungen in Britisch Honduras 1904. P. 142.
—— Meteorologische Beobachtungen an der Goldküste. Pp. 142-143.

Petermanns Mitteilungen. Gotha. Band 52. 1906.
Supan, [Alexander]. Die Erforschung der höheren Luftschichten über dem Atlantischen Ozean im Sommer 1905. Pp. 20-22.
Hopfner, Friedr ch. Die thermischen Anomalien auf der Erdoberfläche. Pp. 32-36.
—— Der jährliche Gang der Temperatur auf der Erdoberfläche. Pp. 37-38.

Physikalische Zeitschrift. Leipzig. 7 Jahrgang. 1 Apr., 1906.
Nippoldt, A[lfred]. Zum Einfluss der totalen Sonnenfinsternis vom 30 August 1905 auf die erdmagnetischen Variationem. Pp. 242-248.

Das Wetter. Berlin. 23 Jahrgang. Feb.-Mar., 1906.
Stiepani, Martin. Luzon in seinen klimatischen Beziehungen. Pp. 31-36; 59-64.
Sprung, A. Ueber Regenstreifen. Pp. 49-59.

Hemel en Dampkring. Amsterdam. 3 Jahrgang.
Nell, Chr. A. C. Uitkomsten der waarnemingen omtrent poolbanden, van 1874 tot 1894 hoofdzaklijk te Groningen en te Oosterbeek (bij Arnhem). Pp. 169-174.
Nell, P. J. G. De belangstelling in de meteorologie. Pp. 174-177.
Nell, Chr. A. C. De halo's. Pp. 176-182.

THE OPPORTUNITIES OF THE WEATHER SERVICE.

The recall of Mr. Ashley from Hawaii to Pittsburg, while a promotion of an excellent man to one of the most responsible positions in the service, would, of course, not have been ordered had it not been for the opening made by the appointment of his predecessor, Mr. Ridgway, to the position of Commissioner of Public Safety of the city of Pittsburg. Mr. Ridgway has a lifelong record of sterling integrity, conscientious devotion to duty, and energetic ability in matters of usefulness. His case is one of the best examples of the development of a young man under the training and discipline

that comes with the Weather Bureau service. Every Weather Bureau station is important, not only to the public, because of what we can do for it, but also to the observer in charge, because of what it can do for him. The stations offer innumerable opportunities to the observers to show their ability in perceiving and utilizing opportunities of usefulness to the community. The quicker a man is to see these chances, so much the surer is he to rise in the esteem of the people and of the Chief. We understand that Mr. Ridgway, from the date of taking charge at Pittsburg, devoted himself to mastering the situation as it then existed. The community came to have such confidence in his work, and such confidence in him as a man, that the new municipal administration has called him to an important public office at a large salary. Of course such public offices are not usually held by one person for many consecutive years, and we presume that Mr. Ridgway will eventually return to the Weather Bureau. Meantime we doubt not that his furlough will give him an opportunity to do a very important public work for the city of Pittsburg, and that the Weather Bureau will be proud of his career.—*C. A.*

DROUGHT AND ATMOSPHERIC ELECTRICITY.

The Chief of Bureau has received an interesting letter from Mr. W. de Ruyter van Steveninck, dated Curaçao, March 31, 1906, which may be summarized as follows:

> The island of Curaçao is at latitude 12° north, longitude 69° west, and is occupied by over 50,000 inhabitants. It is 58 kilometers long, 11 to 3 kilometers broad, and is very hilly, the highest hills rising 1200 feet. It is generally said that the rainfall was much greater fifty years ago, which I ascribe to the fact that the trees then existing conducted the negative electricity of the earth to the positive electricity of the air, thereby causing fog or rain; but these trees have now perished, and rain is scarce. It is well known that the air is always positive and the earth always negative; that where there is lightning there is also rain, and that where there is rain there is also lightning; where the lightning is strong the rain is often luminous (voluminous?). There must exist a formula showing the relation between the vapor in the air and the atmospheric electricity.

Rain does not fall in tropical trade-wind regions unless the warm surface air is suddenly raised, either by impinging on a mountain slope, or by being pushed up over an advancing stream of cooler air near the ground, or by rapidly rising in very warm localities. But these ordinary natural methods of making rain sometimes fail to bring rain for months or years together. Such failures are not to be attributed to the cutting off of woodland, or to any recent changes in the surface of the ground. General droughts and rains result alike from very extensive changes in the so-called general circulation of the atmosphere, or changes in the general position of the great centers of high and low pressure. According as these oscillate several hundred miles either way, a locality such as Curaçao may be left one year in a region of rain, and another year in a region of drought. These changes are progressive and slow; the oscillations occupy at times ten, fifteen, or twenty years; when we understand these we shall be able to predict seasons of large or small rainfall, but that time is still far distant. We do not see how any known relation between rainfall and atmospheric electricity can be of much help even in suggesting rational methods of experimentation, but the importance of the subject is so great that we gladly commend the problem to the attention of physicists.

As to our knowledge of the connection between rain and electricity we must refer to the best general summary of our knowledge of atmospheric electricity given by Mr. George C. Simpson, in the Quarterly Journal of the Royal Meteorological Society, London, October, 1905. According to this summary the electrified condition of the atmosphere consists in the presence of ions, i. e., corpuscles, atoms, or possibly molecules, of some gas or vapor in the atmosphere, each of which carries an elemental charge of electricity. A neutral atom or molecule may be broken up into two smaller corpuscles or molecules, one of them charged positively, and the other negatively. If these smaller portions reunite they will again perfectly neutralize each other. If, however, most of the positive molecules collect in one region, and the negative in another, then those two regions are said to be respectively positively and negatively electrified, that is to say there is a preponderance of the positive and negative in the respective regions. Thus, observations show that there are more positive than negative ions in the air near the surface of the ground, or near the surfaces of objects resting on the ground. The ground itself usually has a negative charge, and this would seem to suggest a plausible explanation of the reason why there is a positive charge in the air near by. A body charged with negative electricity and located in the lower atmosphere loses this charge more rapidly than it would lose a corresponding charge of positive electricity. This rapid dissipation is apparently explained by the fact that there is an excess of positive ions in the lower atmosphere, and that these, coming in contact with the body, carry off or neutralize its negative electricity. The excess of positive ions in the lower air is probably explained by the fact that the negative earth attracts the positive ions toward it.

The fundamental problem in atmospheric electricity is to determine what forces are at work in the air to produce, or introduce, these positive and negative ions. The electrified condition of the air, and the dissipation of electricity from a charged body would not be possible without the presence of ions, and no ions can be produced without the action of some ionizer powerful enough to do the great work that is going on. Mr. Simpson enumerates five possible atmospheric ionizers.

1. *Ultraviolet light.*—The ionization produced by ultraviolet rays from the sun appears to be confined entirely to the highest strata of the atmosphere, and can only produce an appreciable effect in the lower atmosphere when that upper air descends to levels that are accessible to us, by which time, however, its electric condition may have been greatly modified.

2. *High temperature.*—When a gas is heated to a very high temperature a sudden ionization takes place. It is possible that in this way volcanic eruptions contribute a small fraction of one per cent to atmospheric electricity.

3. *Chemical processes.*—This is a possible method; thus the production of ozone in the air, especially at the high temperature of the lightning flash, may contribute something, but the relation between ozone and ionization is at present hypothetical.

4. *The Roentgen or X rays.*—These rays seem to be everywhere present to a feeble extent, traversing the atmosphere in all directions. Their ultimate origin is as yet unknown, but they have the power of producing an appreciable percentage of ionization.

5. *The Becquerel, or alpha, beta, and gamma rays, given off by radio-active bodies.*—The gamma rays are essentially the same as the X rays of the fourth item. The alpha and beta rays are very efficient ionizers.

(a) It is supposed that alpha and beta rays emanate from the sun, because by this hypothesis we may explain several geo-physical phenomena, such as the earth's magnetism, the aurora borealis, and the variations of these latter with sun spots and solar prominences. These rays from the sun must, however, be absorbed by the upper atmosphere, and do not satisfactorily explain the ionization observed in the lower atmosphere.

(b) There are innumerable substances, perhaps we may say practically all mineral substances found in the earth's crust, that are radio-active, and the total effect of radiations from these is to produce a very slight ionization in the lower regions of the atmosphere.

(c) There is a radio-active emanation distributed throughout the lower atmosphere. It would seem that radio-active minerals give off a substance (gaseous or ultra gaseous) known as a "radio-active emanation," which has the power of ionizing gases, but which itself also undergoes a slow change, so that it finally disappears, or at least can not be recognized by any known method. This emanation is, therefore, one source of the ionization of our atmosphere.

Now a careful study of these last three sources of active ionizers, shows that they have not directly any large amount of influence on the dissipation of electricity from a charged body. On the other hand it may, however, be a plausible hypothesis that these electrified ions lose their properties as such by uniting into neutral molecules, or by attaching themselves to the walls, rocks, and trees of the open air, or to the particles of dust, fog, smoke, or vapor that float in the air. In fact the ions seem to form nuclei, on which water vapor accumulates when no other dust particles are present and especially when such dust-free air becomes super-saturated with moisture. An increase in the relative humidity of the air favors the recombination of the ions, or at least their neutralization, so also does an increase in the strength of the wind, and the presence of minute ice crystals at low temperatures. A dissipation of atmospheric electricity is continually going on, and this must have an effect on the negative charge of the earth's surface. There is a close connection between the rate of dissipation and the potential gradient near the earth's surface. The relation is as though the earth were continually receiving a definite quantity of negative electricity, thereby increasing the potential gradient, while the dissipation tends to diminish it. The fundamental problem is to ascertain whence the earth gets its negative charge. The hypotheses or theories attempting to explain this have been numerous, but the three best of them, namely Elster and Geitel, 1900, Ebert, 1904, and C. T. R. Wilson, 1900, have thus far failed to explain the phenomenon satisfactorily.

The preceding remarks refer to the normal conditions as to atmospheric electricity, but the abnormal conditions, which give rise to the aurora, lightning, and St. Elmo's fire, are matters concerning which we are still almost entirely in the dark. We have not yet been able to observe any connection between the aurora and the electricity of the lower atmosphere. There can be no doubt but that the electrical tension that gives rise to the lightning flash is not a simple abnormal increase in the earth's normal electrical field. The most popular theory is that of C. T. R. Wilson, namely that since aqueous vapor is deposited or condensed on negative ions with greater ease than on positive ions, therefore these fall quickly to the ground, thus giving the earth a negative charge. St. Elmo's fire is simply a brush discharge in consequence of a large potential gradient, which is, however, not large enough to cause a lightning flash. Ball lightning, and *ignis fatuus* are electrical phenomena concerning whose origin or cause we know nothing.—*C. A.*

SEVERE HAILSTORM AT PENSACOLA, FLA.[1]

By W. F. REED, jr., Observer. Dated Pensacola, Fla., March 28, 1906.

A third thunderstorm on March 2 began about 11:30 p. m., coming from the west; at 12:15 a. m. of the 3d there were incessant flashes of lightning and moderate thunder in the west; the thunder became louder and the lightning more blinding up to 1:45 a. m., when the thunder shook the houses; this storm was also attended by excessive rain, heavy hail, and high winds. Excessive rain from 12:40 a. m. to 1:30 a. m. amounted to 1.30 inches, of which 0.35 of an inch fell in the first five minutes. The wind reached 34 miles per hour for the five-minute period ending at 12:44 a. m., with an extreme velocity of 50 miles from the west for the minute ending at 12:43 a. m. A heavy hailstorm began at 12.42 a. m. and ended at 12:47 a. m.; the stones ranged from two-tenths to seven-tenths of an inch in diameter; most of them were the size of hazel nuts, and were somewhat flattened, with a center of hardened snow surrounded by transparent ice; the largest ones were of irregular shape, consisting of alternate layers of opaque snow and coatings of ice. About one-fourth of an inch of hail fell one mile northwest of the station; the fall was considerably heavier at the station, as evidenced by the markings of the hailstones on the western sides of the instrument shelter, rain gages, stone chimneys, ventilators, etc. This storm, coming as it did with high winds, which for the minute mentioned were in severe gusts, and with excessive rainfall, had the effect of cleansing thoroughly the spots where the hail struck, so that they could be counted on hard metal surfaces. It is reported that the hail drifted to a depth of two inches on the windward sides of three-story buildings near the Custom-House. This is probably true, as the count of the markings upon the instrument shelter, the tipping-bucket rain gage, and ventilators gave an average of 1000 marks to the square foot. At 2:25 a. m. there was vivid lightning and faint thunder from over the eastern horizon, the clouds overhead came from the west, and at that time a hissing, whistling sound could be heard which was strongest on the west side of buildings; this noise was also heard by other parties in different parts of the city. At 4:35 a. m. the sky had cleared. No very great damage resulted from this storm. The tin covering the west side of the shaft leading out on the roof of the Government building was dented over every inch of surface exposed. The anemometer cups were badly battered; 40 large dents were taken out of them. From all information that could be gathered, it is inferred that the track of this hailstorm was four miles in breadth, covering the entire city of Pensacola and its suburbs; it was traced to a point more than seven miles west of the station and beyond Bayou Texar, which is three miles to the east.

[1] This article is taken from the monthly meteorological report [Form 1014 A] of the Pensacola station for March, 1906, giving an account of a severe local thunderstorm which occurred on the night of the 2–3d.

A PECULIAR TEMPERATURE FLUCTUATION.

By Prof. WINSLOW UPTON, director of the Ladd Observatory. Dated Providence, R. I., April 2, 1906.

A peculiar thermometric change attended the passage of the barometric depression of March 3 over southern New England. The center of this depression, according to the observations of the Weather Bureau stations at 8 p. m. of the 3d and 8 a. m. of the 4th, went nearly over Providence, R. I., early on the 4th. The lowest barometric reading was recorded at 5 a. m. on the registering barometer (Richard Frères pattern) of the Ladd Observatory. The thermograph curve at this station shows that the temperature rose rapidly as the center approached, from 35° to 50° between 8 and 10:30 p. m., and to 52° by 3:20 a. m. Then it fell from 52° to 35° in an hour and a half, reaching its minimum just as the center of the depression passed. A rise to 48° by 11 a. m. followed, coincident with the slow rise of pressure. This was followed by the usual fall of temperature as the pressure rose and anticyclonic conditions came on.

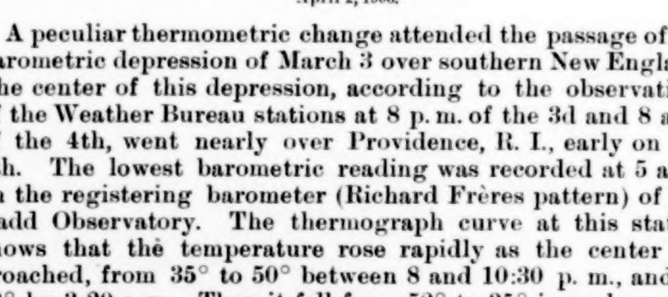


FIG. 1.—Thermogram at Providence, R. I., March 3–4, 1906.

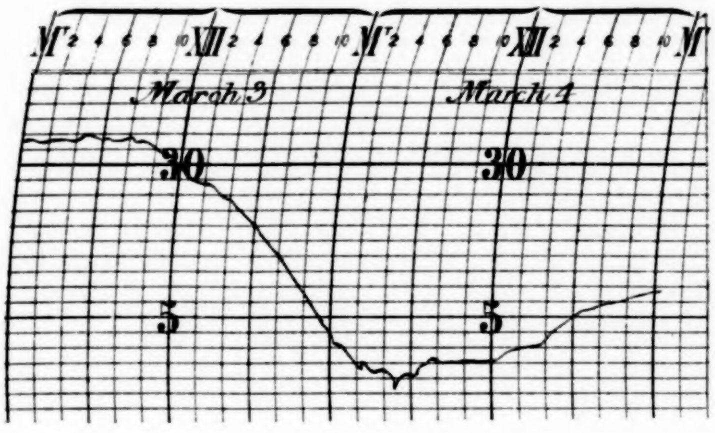


FIG. 2.—Barogram at Providence, R. I., March 3-4, 1906.

This temperature fluctuation is shown by the accompanying tracings from the thermograph and barograph. The instrumental corrections of the sheets have been applied in making the tracings, but the reduction of the pressure to sea level has not been made. The elevation of the barometer is 214 feet above the sea. The rise and fall and second rise are well shown. They occurred at night and early morning, overcoming the diurnal changes.

HALOS OF MARCH 1-4, 1906.

Several accounts, some of them quite minute descriptions, of halo phenomena seen during the first four days of March have come to this office from widely scattered points in the western half of the country. Of those reporting to us the first to see the halos was apparently David L. Holmes, of Kellogg, Sonoma County, Cal., who writes:

Yesterday [March 1], for about an hour, between 4 and 5 p. m., there appeared in the sky a circle of white light around the sun, the sun being directly in its center. Vertically above the sun, on the outer edge of the circle, was a bright spot much like the sun in its glare, and at a space of 90° below and on each side of this [were other] bright spots. The fourth, just below the sun, was missing, and the circle [was] incomplete. Outside of this circle was a rainbow,[1] and at the highest part of this bow another bow, which was inverted, touched it. (See fig. 1.) The sun was in the southwest and the rainbows appeared first. Long, flat, slate-colored clouds were in the sky, about a mile high (above Mount St. Helena).

FIG. 1.—Halos seen at Kellogg, Cal., March 1, 1906.

My father told me that twenty-four or twenty-five years ago, while down in the San Joaquin Valley, he saw a rainbow in the shape of a perfect triangle, and with no bright circle or lights.

[1] A colored halo, somewhat resembling a rainbow in appearance. The true rainbow is seen in the part of the sky opposite the sun.—EDITOR.

On March 3 many persons in western Colorado saw the phenomena. Mr. J. B. Willsea, Cooperative Observer at Fruita, Mesa County, Colo., writes:

At about 9 a. m. to-day [March 3], a solar halo made its appearance and lasted until about 11:30 a. m.

Inclosed you will find a crude diagram of the same, as nearly as I can represent it. (See fig. 2.)

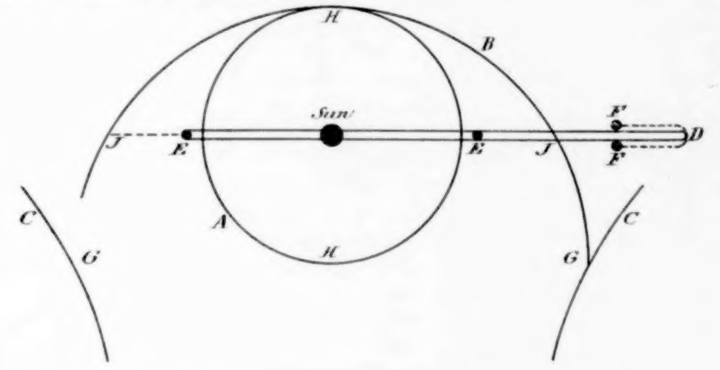


FIG. 2.—Halos seen at Fruita, Colo., March 3, 1906.

There were three perpendicular circles,[2] *A*, *B*, and *C*, or rather four circles, as the two *C*'s were a pair, of similar appearance. There was also a horizontal circle, *DE*.

The circle *A* was about 45° in diameter, with the two bright spots a degree or two outside the circumference. *B* was about 90° in diameter and the two *C*'s, I think, about 180° in diameter, while the horizontal circle was about 90° in diameter, with its center not far from the zenith, moving, of course, with the sun.[3]

The circles were not complete, but showed, toward noon, about as the diagram represents.

A large part of *B* and most of the *C*'s were below the horizon, and their appearance varied from time to time.

The circles *A*, *B*, and the *C*'s were rainbow colored throughout, while *DE* was white, with possibly a light blue tinge. The extreme eastern, or rather southeastern, part of *DE* passed through the sun, the "dogs" on either side, *EE*, and the points *JJ*.

Toward the northwestern part of the circle *DE* appeared two white spots or "dogs," wider than the band of the circle, but no more brilliant than the rest of the white circle; they were about 90° apart (90° of the white circle—heretofore I have spoken of degrees of the circle of the heavens).

"Dogs" appeared at *HH* and *GG*; the latter (*GG*) were on a horizontal plane with lower *H*, but no "dogs" appeared at *JJ*, and none in the circle *DE* save *FF* and *EE*.

The points *GG*, *HH*, and *EE* were very brilliantly colored, but the spots at *EE* were brilliant only on the side toward the sun, while the side of the spot or "dog" away from the sun was of pale blue, but brighter than those at *FF*.

The circle *DE* was more constant than the others in its appearance and form, showing for a long time a perfect circle.

At the point *H* above the sun, the outside of the arc, for a few degrees, seemed of a marked brown color.

From Grand Junction, about fifteen miles southeast of Fruita, we have received the following account by Mr. George H. Ferguson:

Saturday morning, March 3, there was a very unusual display of solar halos. The inclosed drawing (fig. 3) shows quite clearly the position of the different lines. All were of prismatic colors, with the red nearest the sun, except the circumzenithal circle and the two mock suns on the side opposite the sun, which were white.

The second drawing shows a slight change, there being a difference of about one hour between the two.

The two short segments of circles *a* were hardly distinguishable, but I am quite sure they were there. It also seemed to me that the two mock suns *b* were segments of circles as I have represented in the drawing, but I could not feel certain about it.

The heavy lines show where they were especially bright.

The Daily Sentinel, of Grand Junction, printed a description in its issue of March 3, 1906, from which we make the following extracts:

[2] By a "perpendicular circle" the writer evidently means a circle whose center is not at or near the zenith.—EDITOR.

[3] These angular diameters are unsatisfactory—the radii of the two *C* circles should have been measured and the locations of their centers stated more definitely.—EDITOR.

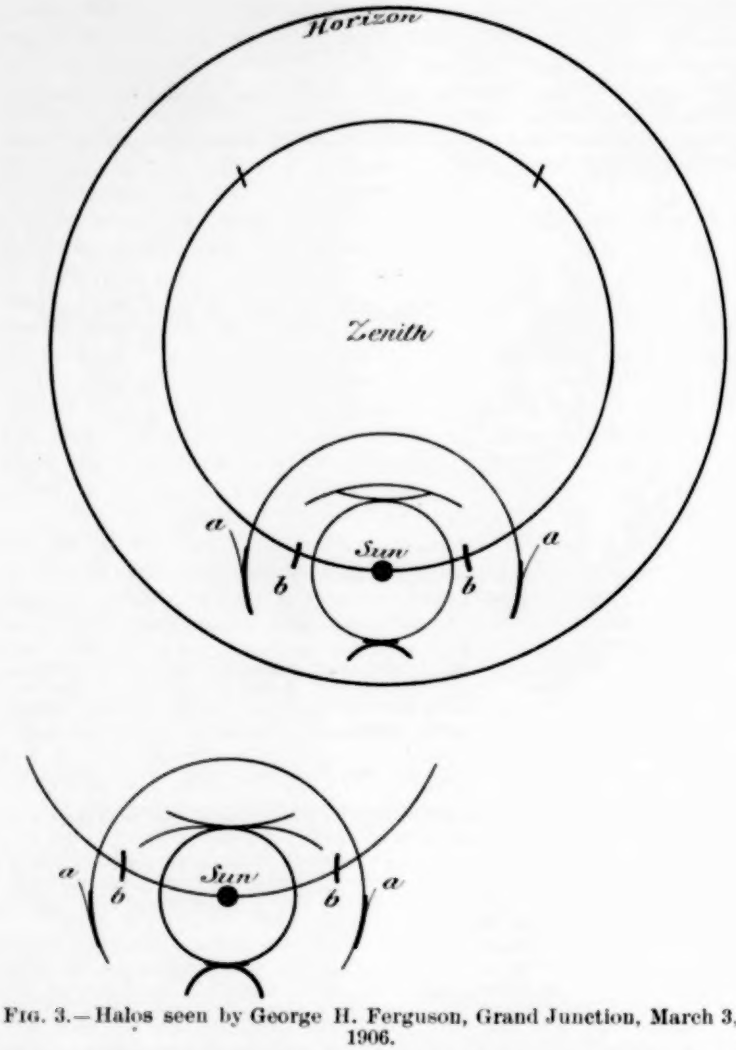


FIG. 3.—Halos seen by George H. Ferguson, Grand Junction, March 3, 1906.

This morning the inhabitants of the city and valley were privileged to witness one of the prettiest and most interesting displays in the heavens imaginable.

In the northwest, in the northeast, in the southeast and in the southwest and entirely across the northern sky appeared the sun dogs and solar halos; some were in colors and resembled rainbows, while others were of silver white.

Mr. Hardinge, the local weather observer, stated that the display was made up of a full complement of solar halos and mock suns, the latter better known as sun dogs; there was one ring of about 45°, and then a great ring apparently through the sun and around the zenith. The first two rings were prismatic in their makeup, being of varied colors, while the latter ring was white.

From a sketch and description by Dr. C. P. Blachly, Cooperative Observer at Manhattan, Kans., Mr. Geo. F. Freeman, a photographer, has made many blue prints, one of which was forwarded through the official in charge at Kansas City, Mo. Part of this is reproduced in fig. 4. The description states that:

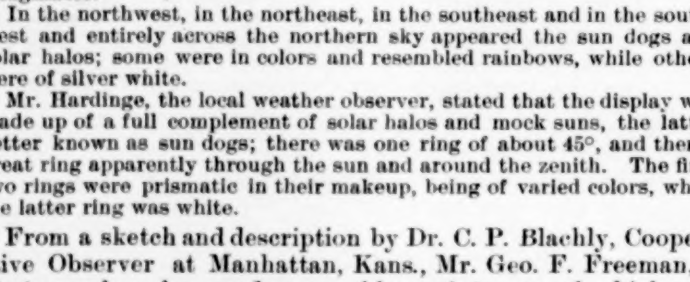


FIG. 4.—Halos seen at Manhattan, Kans.

They [the halos] were visible for several hours; the drawing, however, shows the appearance at 4:10 o'clock. Their positions remained the same, but different parts varied in intensity. The long horizontal halo extending through the sun, and nearly around the horizon except the northeast, was white, with brighter nodes at intervals. The one immediately around the sun, the elliptical one, and the first reversed bow were red on the side toward the sun, bright whitish yellow in the middle and light violet on the side away from the sun; the large halo and the outer reversed one were deep vermillion on the side toward the sun, rich orange in the middle, and deep violet on the outside. The elliptical halo seemed to have a distinct reentrant curve just above the sun. The sky was evenly hazy throughout; next day a heavy snowstorm followed.

The blue print states that the halos were seen on Sunday, March 3, but the calendar shows that March 3 was Saturday. The weather maps show that the heavy snowstorm which came next day occurred Monday, the 5th; therefore the halos were presumably seen Sunday, March 4.

The following description is reprinted from an article by S. D. F., in the report for March of the Kansas section of the Climatological Service of the Weather Bureau:

AN UNUSUAL SOLAR HALO.

A solar halo of unusual beauty and appearance was observed at Topeka, Kans., on the afternoon of Sunday, March 4, 1906.

At 4:40 p. m. [central time] there were seen segments of five prismatic colored halos about the sun. These are roughly represented by the following diagram, fig. 5:

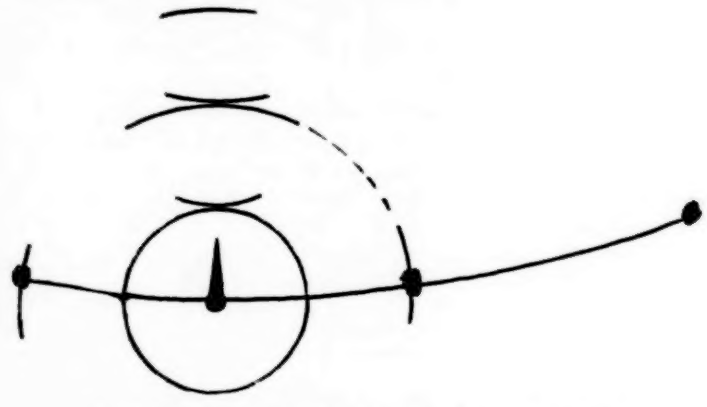


FIG. 5.—Halos seen at Topeka, Kans., March 4, 1906.

A halo of 22° completely encircled the sun. An arc about 40° long of a 22° halo, turned with its convex side to the sun, touched the upper portion of the first halo. Encircling these were three segments of a 46° halo, arranged above and on each side of the sun. At times the upper arc and the segment on the north side of the sun were faintly united, making 160° of the halo visible. Above these, touching the upper arc of the 46° halo and turned convexly to the sun, was a 40° segment of a halo, in which the colors were unusually well separated. Above this arc could be seen a faintly-defined segment of another halo turned with its concave side to the sun. At the points where the white circle crossed the 46° halo white parhelia, or mock suns, appeared brightly, and a white pillar of light could be seen extending upward from the sun nearly to the innermost halo. The white circle extended from its intersection with the south segment of the 46° halo to 190° azimuth,[4] ending in a faint parhelion.

In each of the colored halos the prismatic colors were arranged with the red on the side nearest the sun, being on the inner side of the encircling halos and on the outer side of the ones turned convexly to the sun.

These halos were visible with varying degrees of distinctness for about an hour, when the outer ones began to disappear. By sunset only the upper portion of the innermost halo and the pillar of light were visible.

During this time the sky was overcast with a thin, whitish sheet of cirro-stratus clouds, which had been present most of the day and had produced a single halo from 10:50 a. m. till the others appeared.

Mr. T. B. Jennings, Section Director at Topeka, writes that his own observations of the halo agreed fully with those of his assistant, Mr. Snowden D. Flora, as given above.

A good description of similar halos may be found in Loomis's Treatise on Meteorology, pp. 216–225 (1883 edition), Section V of Chapter VIII. The student may also find articles discussing the theory in the MONTHLY WEATHER REVIEW, January, 1905, Vol. XXXIII, pp. 11–13, and June, 1902, Vol. XXX, p. 317.

[4] That is, 10° E. of N., since azimuths are counted from S. to W., etc.

WEATHER BUREAU MEN AS EDUCATORS.

The following lectures and addresses by Weather Bureau men are reported:

Mr. H. F. Alciatore, March 27, 1906, before the Science Department pupils, Little Rock, Ark., High School, on "The United States Weather Service and the weather map"; two later lectures, in April, are to complete the course.

Mr. E. A. Beals, January 20, 1906, before the Oregon State Academy of Sciences, on "General motions of the atmosphere," with lantern slide illustrations.

Mr. L. H. Daingerfield, March 23, 1906, at the Pueblo, Colo., High School, on "Weather proverbs and superstitions."

Mr. A. J. Mitchell, March 29, 1906, before the Southeastern Stock Growers' Association, in convention at Kissimmee, Fla., on "Climate and stock raising."

Mr. T. S. Outram, February 12, 1906, before the Searchlight Club of the Young Men's Christian Association, Minneapolis; also February 26, 1906, at the North High School, on "The Weather Bureau and its work"; also March 3, 1906, before one of the geology classes in the University of Minnesota, on "A half century of weather service."

Mr. C. F. von Herrmann, March 9, 1906, at the Deichmann Preparatory College, Baltimore, Md., on "How weather forecasts are made," with lantern slide illustrations.

Mr. F. J. Walz, March 3, 1906, at the Highland Presbyterian Church, Louisville, Ky., on "The methods of work of the Weather Bureau."

Classes from schools and academies have visited Weather Bureau offices, to study the instruments and equipment and receive informal instruction, as reported from the following offices:

Binghamton, N. Y., March 7 and 8, 1906, the physiography class of the local High School.

Minneapolis, Minn., March 22, 1906, a large class from the East High School.

Portland, Oreg., November 28, 1905, class from St. Helen's Hall; during December, 1905, and January, 1906, five classes or divisions from the local High School; March 28, 1906, the science class from St. Mary's Academy.

Pueblo, Colo., March 9, 1906, two classes in physiography from the Central High School.

Springfield, Mo., March 8 and 9, 1906, the physical geography class of the local High School, in two sections; also March 10, 1906, the physics class of the Republic, Mo., High School.

KITE FLIGHT OF APRIL 5, 1906, AT MOUNT WEATHER OBSERVATORY.

By Dr. O. L. FASSIG, Research Director. Dated Mount Weather, Va., April 11, 1906.

During the past three or four years an increasing number of national weather services in Europe have been cooperating in an effort to secure simultaneous records of atmospheric conditions at considerable elevations above the earth's surface. The methods employed to raise self-registering instruments thousands of feet into the upper atmosphere have varied at different stations, kites being used at some, while free or manned balloons were employed at other stations. In a few cases kites, small free balloons and manned balloons are sent up from the same station.

Up to the present time the only cooperating station in America has been the well-known Blue Hill Observatory, near Boston, Mass., under the direction of Mr. A. L. Rotch. The plan followed by international agreement has been to send up kites and balloons on the first Thursday of each month, and, when practicable, also on the preceding and the following day. As the national daily weather charts are in most cases prepared from data observed at an early morning hour, ascents are generally made in the morning so as to afford a more satisfactory basis of comparison of observations made at the earth's surface and at higher levels.

For two years or more the Chief of the Weather Bureau has been making active preparations at the recently established research station on Mount Weather, near Bluemont, Va., for the systematic exploration of the atmosphere at high levels; and the instrumental equipment is now such as to warrant the beginning of an attack upon problems which can be settled at a single station, and to cooperate in the investigation of problems which require for their solution the participation of many stations.

Thursday, April 5, was "International Day" for the month of April and marked the beginning of systematic kite flying at the Mount Weather Observatory. The day opened with an overcast sky and a fresh wind from the northwest. At 7:45 a. m., when the first kite of the day was launched, the surface wind was blowing at the rate of about 20 miles per hour (9 meters per second) and the kite rose rapidly and steadily, maintaining a good angle, averaging about 55°, with a length of line varying from 1000 to 5000 feet. Two kites of the Hargrave-Marvin pattern were attached to the wire, the second kite at a distance of 5000 feet from the first. The total lifting surface of the two kites was about 98 square feet (9 square meters). The wire employed was steel piano wire having a diameter of 0.028 inch or 0.71 millimeter.

The greatest elevation reached by the upper kite was 9000 feet above sea level, at 9:45 a. m., with 11,000 feet of line wire out. The elevation of the station is 1725 feet above sea level, and about 1300 feet above the level of the valley. The lowest temperature recorded (34° F.) occurred at an elevation of 7300 feet, the pressure at the same time registering 22.6 inches.

Shortly after the upper kite entered the layer of stratus cloud there was a rapid and marked rise in the temperature from 34° to 45° F. in three minutes. The humidity curve is particularly interesting. Corresponding in time with the sudden rise in temperature after entering the clouds there was a rapid drop in the humidity. The instrumental record is doubtless in error by an amount varying from 5 to 8 per cent in the lower portion of the scale, as the entire range of the humidity trace is slightly over 100 per cent. But allowing for the probable instrumental error the record still shows the existence of a remarkably dry stratum just above the thin layer of stratus cloud through which the upper kite passed.

The tabulated record of observed readings at the surface station and of transcribed readings from the tracings of the kite meteorograph is shown in Table 1.

The weather map of the Weather Bureau for 8 a. m. of the 5th of April indicated the presence of an area of high barometric pressure over the Gulf States and the South Atlantic States, and over the Rocky Mountain Plateau. There was a well developed barometric depression over the Gulf of St. Lawrence, and a secondary depression over the middle Mississippi Valley. The area of cloudiness embraced the entire country east of the Rocky Mountains, with the exception of the South Atlantic States and the eastern portions of the Middle Atlantic and New England States. Rain was reported at 8 a. m. over a wide area surrounding the center of the secondary depression in the Mississippi Valley. A light sprinkling rain was falling at Mount Weather, the only station east of the Ohio River reporting rain at the time of the morning observation. The temperature steadily decreased from about 60° F. in the Gulf States and South Atlantic States to 30° F. in the St. Lawrence Valley and the upper Lake region.

At 10:10 a. m. the upper kite, supporting the Marvin meteorograph, broke away. As the kite was hidden by the clouds at the time, the accident was not at once discovered. The decreased pull of the wire at the reel and the diminished angular elevation of the lower kite soon revealed the fact, however, that something was wrong. The wire was rapidly reeled in,

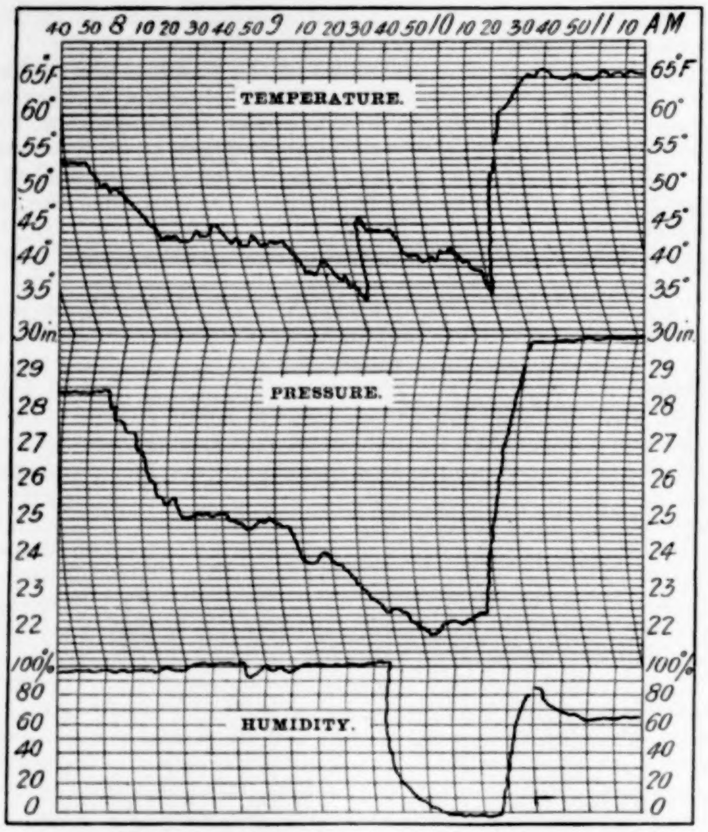


FIG. 1.—Meteorograph tracings for kite flight of April 5, 1906.

Kite flight at Mount Weather, Bluemont, Va., April 5, 1906.

At kite.						At station.					Remarks.
Time.	Above sea level.	Pressure.	Temperature.	Relative humidity.	Wind direction.	Pressure.	Temperature.	Relative humidity.	Wind. Dir.	Wind. Vel.	
a. m.	*Feet.*	*Ins.*	*° F.*	*%*		*Ins.*	*° F.*	*%*		*m. p. h.*	
7:47	1725	28.2	53	95	nw.	28.2	53	82	nw.	21	Cloudiness, 10 stratus, with occasional light sprinkling rain.
7:49	2155	27.8	51	96							
7:53	2565	27.2	49.5	97							
7:56	2925	27.0	48.8	98	w-nw						
8:00	3440	26.5	48	99	w.	28.2	52		nw.	15	
8:04	4210	25.8	46.5	99							
8:10	4920	25.2	43	99					n.		Kite entered scud; reappeared several times.
8:14	5260	24.9	42	100			52		nw.	9	
8:50	5580	24.7	41	98	w.		53	85			Second kite attached.
9:07	6590	23.9	37	100							First kite at base of clouds.
9:12	6200	23.7	39	100			53		nw.	9	
9:24	7330	22.6	34	100							First kite hidden at times by lower clouds.
9:29	8025	22.3	44	34			54		nw.	16	
9:37	8220	22.0	43.5	10							
9:45	9000*	21.6	40	2			54		w.	12	
10:08		22.2	38	0†		28.15	55		nw.	12	Upper kite with meteorograph broke away while hidden by cl'ds.
10:22		29.5	59.5	85			56		nw.	11	Landed in valley about 12 miles due east from station.

* Based on barograph tracing; other elevations based on angular elevation of kite and length of wire out. † A correction of 5 to 8 per cent should probably be applied to the lower portion of the scale of the hair hygrometer.

NOTE.—Number and kind of kites: 2 Hargrave-Marvin kites with a total lifting surface of 98 square feet. Station elevation, 1725 feet. Greatest elevation above station, 7300 feet. Greatest elevation above sea level, 9000 feet. Greatest length of wire out, 11000 feet

and the loss of the upper kite was then soon made evident. The kite broke away at an elevation of about 7000 feet above the station. It was found the following morning at a point in the valley about 12 miles due east from the observatory. The meteorograph traces showed clearly the time at which the kite broke away and the time at which it struck the ground; a difference of about eleven minutes indicates an average velocity of the kite after it broke away of over one mile per minute. The accident was due to the breaking of the steel wire at the point of attachment of the upper kite. In landing the second kite, the length of the line between the upper and lower kites (about 5000 feet) was stretched across the tops of the forest trees on the mountain side, and was reeled in without any difficulty and without loss. The upper kite landed upon some rocks in the valley, breaking some of the sticks; the instrument was not injured in the slightest degree, while the record was distinct and complete. The tracings of the meteorograph are reproduced in fig. 1.

WHERE ARE THE OLD RECORDS OF HAITI?

The efforts lately made by the Editor and his colleagues to collect and publish such data as we can, relative to the climate of Haiti, have led us to hope that we may recover the elaborate records kept in that country by its French residents between 1750 and the Napoleonic era. These records were collected most assiduously both by Cotte in Paris and by Moreau de St. Méry. The latter published extracts in his Description Topographique, printed at Philadelphia in 1797. The former published tabular data in full in the annual volumes of the Histoire de la Société royale de Médicine and also in his Météorologie, but he must have had large manuscript collections that are not yet published. The following letter from a member of the council of the Astronomical and Meteorological Society of Port au Prince shows that antiquarians may still hopefully search for these lost documents in New Orleans, La., in Philadelphia, Pa., and in France:

[Translation.]

PORT AU PRINCE, *August 24, 1905.*

CONSTANTIN,
Director of the Observatory of the Astronomical and Meteorological Society of Port au Prince.

MY DEAR BROTHER: In reply to your communication in regard to the meteorological observations of Le Febure des Hayes, made from 1772 to 1788 at Tivoli, or Tifoly, in the parish of Jeremie, I would say to you that I have already instituted a search on this same subject for Mr. Leger, our minister to Washington, but I found nothing.

If Mr. Le Febure des Hayes had willed his manuscript to the club of the Philadelphians and to the Royal Society of Sciences and Arts in the same town,[1] these papers should be in France. In 1803 the French, in evacuating the Cape, did not leave anything in the colony they were forced to abandon, but took with them all the archives of this portion of the French Empire.

The memoirs or studies, as far as published either by the Royal Society or by the club, may be found in New Orleans, La., and in Philadelphia, Pa.; these two American cities received a great many French people after the evacuation of Santo Domingo. In Europe everything relating to the old colonies will be found in the archives of Versailles; at the Academy of Sciences of Paris; at the Academy of Bordeaux; at Brussels, at Mr. Haylaerts's, who was formerly consul from Haiti to the residence in that city. I know that Mr. Haylaerts collected a great many documents relative to the ancient colony of Santo Domingo and to the independent state of Haiti. There were a great many works on Haiti at the Library of Americana, Rue Gusuégan. I do not know whether this establishment is still in existence. At Port au Prince there are a great many pamphlets, books, thin bound books, notes, and memoirs, in the library of the Little Seminary of St. Martial (Petit Séminaire St. Martial), to which Lieutenant Pradiness had confided a part of his collection.

I shall be happy if this information is of any use to the meteorological bureau at Washington. In this hope I beg you to accept, dear brother, the assurance of my most affectionate sentiments.

(Signed) JUSTIN BOUZON.

THE ZODIACAL LIGHT.

By Mr. MAXWELL HALL. Dated Montego Bay, Jamaica, W. I., February 12, 1906.

It is now thirty years since I first measured the breadth of the zodiacal light at various distances from the sun. The observations were made at Kempshot, Jamaica, at an elevation of about 1800 feet above sea level, and the results were pub-

[1] Le Cap or Cape Haïtien.

lished some years afterwards in Jamaica Weather Report No. 27, for May, 1883. They are given in Table 1.

TABLE 1.—*Results of the first series of observations of zodiacal light at Kempshot, Jamaica, W. I.*[1]

Angular distance from sun. °	Breadth of zodiacal light. °
30	41.4
40	38.7
50	36.1
60	33.4
70	30.7
80	28.1
90	25.5
120	17.8
180	7.0

In the absence of the moon the zodiacal light was always seen as a band following the ecliptic; and it appeared to me, more particularly with regard to the portions at considerable distances from the sun, to be a terrestrial phenomenon.

After a good many years it became clear that no ordinary observations would be able to prove the true nature of the light, and then the spectroscope was applied. I borrowed a large instrument from the Royal Astronomical Society of London and had it arranged for this work. The zodiacal light showed no bright or dark lines; its spectrum, what there was of it, was continuous, and coincided with the brightest part of the solar spectrum; and to all intents and purposes it was identical with the spectrum of twilight.

TABLE 3.—*Results of observations of the zodiacal light at Jamaica during 1899 and 1901.*

Distance from sun. °		Breadth. °	
28	33°	60	37°
32		27	
34		16	
34		24	
35		56	
45	46°	22	29°
45		40	
49		25	
51	55°	30	26°
53		23	
55		27	
55		20	
55		25	
55		25	
56		26	
56		27	
56		27	
58		28	
59		26	
65	75°	27	20°
73		19	
74		25	
75		24	
76		15	
77		23	
80		11	
82		15	
103	108°	12	12½
105		5	
108		17	
111		18	
114		11	
148		12	

Since that time I have adapted a small direct vision spectroscope for this purpose; the collimating lens was removed, the slit was put several inches away, and an adjustment was made between the width of the slit and its distance from the train of prisms. In this way I got a slit a tenth of an inch wide, and an inch and a half in length, which not only allows all the chief solar lines to be seen in the daytime, but also the faint continuous spectrum of the zodiacal light at night. All that I could gather from these observations showed that the zodiacal light was reflected light from the sun.

Then, in 1899 and 1901, I made a series of most careful observations, not only of the breadth of the light, but of its boundaries at different distances from the sun. My object was to see whether such careful work would do what time and ordinary observation had failed to do. These observations are given in detail in Table 2; the results are summarized in Table 3.

Sometimes the breadth at various points was deduced from the stars, sometimes it was measured by a rough, simple instrument, but in the latter case the process was first to find a star on the central line of the zodiacal light, and then to measure through that star across the line of the light. Both methods had their advantages.

The breadths at 30°, 40°, and 50° were much as before; beyond this the new breadths diminished by 5° or so, agreement occurring again near opposition, or 180°.

Combining the two series, the breadths given in Table 4 have been adopted.

TABLE 4.—*General results of the first and second series of observations.*

Distance from sun. °	Breadth of zodiacal light. °
30	44
40	38
50	33
60	29
70	25
80	21
90	18
120	13
180	6

Instead of the light being bounded by straight lines from the horizon upward the lines are now curved as in the accompanying fig. 1, which gives an idea of the general appearance of the zodiacal light when it stands at a right angle to the horizon in the evenings in the month of March; and it will be noticed that the boundaries are so curved that we may continue them below the horizon, assuming that there are no cusps at the junction of the two branches, at 0° from the sun. Thus we get the following values:

Distance from the sun. °	Breadth of zodiacal light. °
0	61
10	56
20	50

Now at an altitude of 8000 feet in the Alps in Switzerland, Prof. Simon Newcomb has recently made some observations at midnight on that part of the zodiacal light at 0° from the sun,[2] and found the breadth as much as 70°.

The difference between my 61° and his 70° is due to the following circumstance. In the Tropics there is always much diffuse light along the horizon at night, which so combines with the zodiacal light as to make its breadth difficult or impossible to observe on or near the horizon; and I am aware that my breadths near both the sun and the horizon were underestimated.[3]

With regard to the gegenschein, or counterglow, this is a somewhat stronger illumination, more or less opposite the sun, and irregular in every way; sometimes it is not visible, sometimes it is very distinct; sometimes it is a round spot, sometimes it is no broader than the usual 6° or 7° at 180° from the sun, but as much as 30° in length. When the zodiacal light was regarded as a terrestrial phenomenon the counterglow was supposed to be due to the concentration of rays of light swept back from the earth by the action of the sun.

[1] The intermediate breadths, 90°, 25.5; 100°, 22.9; 110°, 20.3; 120°, 17.8°; 130°, 15.3; 140°, 15.0; 150°, 10.8; 160°, 8.9; 170°, 7.6; as originally printed in the weather report of the Jamaica Gazette for June 21, 1883, although now omitted by Mr. Hall, are here added as being of interest to all students of this subject.—EDITOR.

[2] Query: "Having the same longitude as the sun"?—EDITOR.

[3] Thus, on March 5, 1899, the following note was made: "At 7^h 20^m the zodiacal light combined with twilight at the horizon so that it was 70° broad along the horizon."

TABLE 2.—*Second series of observations of the zodiacal light in Jamaica, 1899 and 1901.*

Date.	Hour.	Branch.	Longitude.	Latitude.	Breadth.	Distance from sun.	Starlight.	Place.	Notes.	Sun's longitude.
1899.			°	°	°	°				°
Jan. 8	7 p. m.	E.	323	0	16	34	Bright	K.	From β Aquarii to beyond δ Capricorni by half the distance between β Aquarii and δ Capricorni	289
	7 p. m.	E.	5	−3	15	76	do	K.	Between γ Pegasi and β Ceti and nearer γ. Width less than half the distance	289
	7 p. m.	E.	34	?	5	105	do	K.	South of α and β Arietis. Faint. About 5° wide. Position of center not measured. Zodiacal light fainter than usual. Stopped by Milky Way.	289
Jan. 9	7 p. m.	E.	335	0	22	45	do	B. H.	From α Aquarii to 2° beyond δ Aquarii	290
	7 p. m.	E.	324	−3	24	34	do	B. H.	From β Aquarii to two-thirds the distance between δ Capricorni and Fomalhaut; brightest at δ Capricorni; faint below Aries; as the zodiacal light set it seemed to widen.	290
Jan. 10	8 p. m.	E.	356	−1	27	65	Dim	B. H.	Breadth measured; half an hour later it was 30°, and then the sky clouded	291
Jan. 11	5 a. m.	W.	242	+1	25	49	Bright	B. H.	Center at β Scorpii. Breadth measured. Much diffused light. Venus troublesome. Zodiacal light traced to Mars.	291
	8 p. m.	E.	9	−2	23	77	Dim	B. H.	Center between γ Pegasi and η Ceti. Zodiacal light dim	292
Jan. 12	4 a. m.	W.	189	+3	12	103	Bright	B. H.	Center at γ Virginis. Diffused light	292
	4 a. m.	W.	218	+1	25	74	do	B. H.	Center at Jupiter. Zodiacal light visible as far as Mars. Venus rising	292
Jan. 15	4:30 a. m.	W.	242	+2	23	53	do	K.	Center 1° north of β Scorpii. Zodiacal light faint from γ Virginis to Regulus	295
Jan. 17	2 a. m.	W.	189	+3	17	108	Brilliant	K.	Center at γ Virginis	297
	2 a. m.	W.	149	+1	12	148	do	K.	Center at Regulus	297
	3 a. m.	W.	224	0	19	73	do	K.	Center at α Libræ	297
	3 a. m.	W.	242	+2	20	55	do	K.	Center at 1° north of β Scorpii	297
Jan. 20	3 a. m.	W.	189	+3	18	111	Bright	B. H.	Center at γ Virginis	300
Jan. 21	5 a. m.	W.	246	+6	25	55	Brilliant	K.	Zodiacal light faint. Center between β Scorpii and ζ Ophiuchi. (Venus kept out of sight.)	301
Jan. 22	4 a. m.	W.	246	+6	27	56	do	K.	Zodiacal light faint. Center as in last observation. Gegenschein in Cancer; it appears as a strengthening of the band for about 10° in length. G. = 125°. Up to the present it has been impossible to see the gegenschein on account of the Milky Way and Mars. (Venus kept out of sight.)	302
Jan. 31	7 to 8 p. m.	E.	10	−2	26	59	do	K.	Zodiacal light very bright. Center between γ Pegasi and η Ceti. Breadth from 1° s. f. γ to 3° n. p. η. Gegenschein large and diffused.	311
Feb. 1	7 to 8 p. m.	E.	10	−2	28	58	Bright	B. H.	Zodiacal light very bright. Very much broader at horizon than at Kempshot. Breadth from γ Pegasi to 2° n. p. η Ceti. Center at half breadth.	312
	7 to 8 p. m.	E.	357	?	40	45	do	B. H.	40° broad, 20° above horizon. Gegenschein doubtful	312
Feb. 5	7 p. m.	E.	345	?	60	28	do	K.	Zodiacal light very bright. Breadth 12° above horizon at 7:05 p. m.	317
	7 p. m.	E.	352	?	56	35	do	K.	Zodiacal light very bright. Breadth 15° above horizon at 7:20 p. m.	317
	7 p. m.	E.	8	−1	30	51	do	K.	Between 1° n. γ Pegasi to η Ceti. Gegenschein between Præsepe and the sickle in Leo. G. = 133°. Latitude +3°. A few clouds about.	317
Feb. 6	2:30 a. m.	W.	......	......	......	......	Brilliant	K.	Much diffused light. Zodiacal light faint. Branch traced to the gegenschein, which is very plain between Regulus and Præsepe. G. = 135°. Lat. 0°.	317
	2:30 a. m.	W.	242	+5	24	75	do	K.	Breadth from π Scorpii to δ and ε Ophiuchi. Moon rose at 2:55 a. m.	317
Mar. 4*	7 to 8 p. m.	E.	40	−2	27	56	Dim	K.	Zodiacal light very bright. Breadth from α Arietis to α Ceti, but greatest illumination nearer α Arietis instead of midway. Gegenschein very plain between Regulus and β Virginis, 30° in length. G. = 160°. Lat. = 0°.	344
Mar. 5	7:20 to 9 p. m.	E.	40	−2	27	55	Bright	K.	Zodiacal light very bright. At 7:20 breadth from α Arietis toward α Ceti was only 20°; at 9 p. m. about 10° above horizon it was 27°. This broadening was noticed last night also. The brightest part of the zodiacal light is on the ecliptic and not at −2°. At 7:20 the zodiacal light combined with twilight at the horizon so that it was 70° broad along horizon. Gegenschein as last night.	345
Mar. 20	4:30 to 5 a. m.	W.	......	......	......	......	do	K.	Zodiacal light very feeble. Venus interferes below the Milky Way. Above Milky Way zodiacal light not seen till near the gegenschein on the ecliptic near β Leonis. G. = 170°. The zodiacal light was to the north of Venus. No measures possible.	0
1901.										
July 21	4 a. m.	W.	63	−1	25	55	Dim	K.	Center between η Tauri and α Tauri	118
	4 a. m.	W.	4	−1	11	114	do	K.	Center on line from α Andromedæ through γ Pegasi at equal distance beyond γ Pegasi. Zodiacal light barely seen 20° beyond this point, the sky getting very dim. Zodiacal light faint on the whole.	118
July 22	3 a. m.	W.	37	−1	15	82	do	K.	Center between α Arietis and γ Ceti	119
	3 a. m.	W.	4	+2	......	115	do	K.	Center on line from α Andromedæ through γ Pegasi and three-fourths the distance beyond the latter. Zodiacal light can not be seen beyond; dim sky.	119
July 23	4 a. m.	W.	......	......	......	......	......	K.	Zodiacal light very bright near horizon, very dim near Aries, where sky also becomes dim	120
	4 a. m.	W.	88	−1	27	32	Bright	K.	Center between α Orionis and θ Aurigæ; 27° broad	120
	4 a. m.	W.	83	+1	......	37	do	K.	Center between β and ζ Tauri and nearer the latter	120
	4 a. m.	W.	63	−1	......	57	Dim	K.	Center between η and α Tauri	120
	4 a. m.	W.	40	0	11	80	do	K.	Center between α Arietis and α Ceti and nearer the former	120
Sept. 10	4 a. m.	W.	111	−2	26	56	Bright	K.	Center between Procyon and Castor. Small moon 10° above eastern horizon	167
			0	−3	26	167	do	K.	The gegenschein appeared very broad between β Ceti and a point between α and γ Pegasi; breadth 26°, tapering up from the western horizon. The band across the sky was hardly seen; perhaps the moon interfered. The gegenschein was very uniform, no central condensation. G. = 0°. Latitude = −3°.	167
Oct. 1	8 p. m.	E.	212	+17	......	24	do	K.	Zodiacal light greatly diffused along the western horizon. The light extends between Arcturus and Venus up to the stars in the head of Scorpio. The band was not seen, but the gegenschein was pretty plain. The very small inclination of the zodiacal light to the horizon is due to the diffused light along the horizon.	188
			240	0	......	52	do	K.		
Oct. 5	8 p. m.	E.	......	......	......	......	do	K.	Zodiacal light very clear. Band visible. Gegenschein very plain. It appeared as a feeble zodiacal light tapering above the eastern horizon; same form; dull, uniform light; 20° above the horizon it was 20° in width and tapered up about 40° above the horizon. Longitude 0°. G. = 20°.	192

Abbreviations in the above table: Branch, E. or W. of sun. Scale of starlight: Dim, bright, brilliant. Place: K. = Kempshot; B. H. = Brandon Hill, Montego Bay. G. = the longitude of the gegenschein; s. f. = south, following; n. p. = north, preceding. * Absent from station during the interval February 6 to March 4.

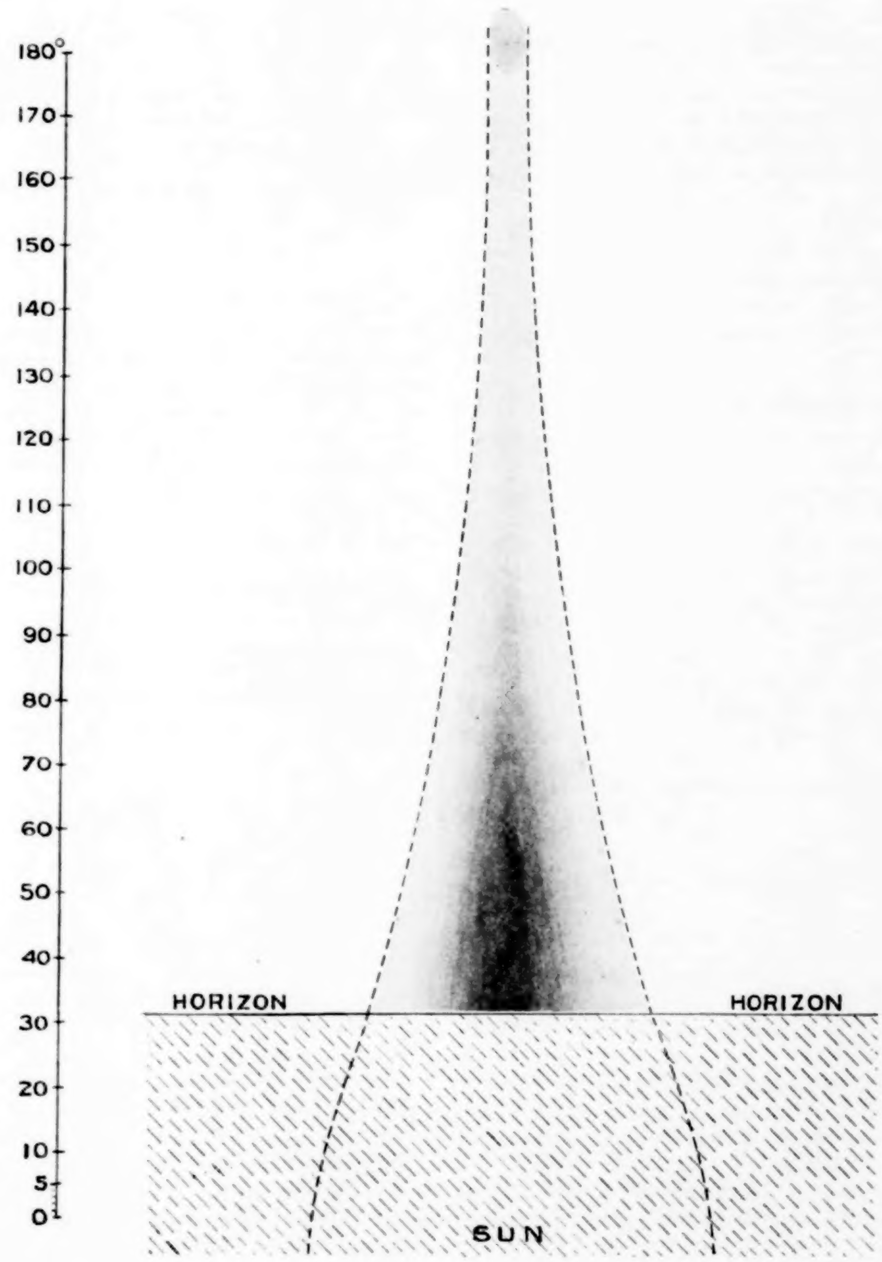


Fig. 1.—General form of the zodiacal light as seen at Kempshot Observatory after sunset in March.

We have now to consider the latitude of various points along the axis of the light; and at first it would seem proper to group the latitudes according to angular distance from the sun; but it will be found that no further information is gained; and for some time after the observations were made it appeared that this most careful work had failed just as the more ordinary observations in past years.

But if, instead of grouping the latitudes according to their distances from the sun, we group them according to the longitudes, or distances from the first point of Aries, we get the values in Table 5.

TABLE 5.—*Location of axis of zodiacal light from Jamaica observations, 1899 and 1901.*

Longitude.		Latitude.	
°		°	
356		−1	
0		−3	
4		+2	
4		−1	
5	5°	−3	−1½°
8		−1	
9		−2	
10		−2	
10		−2	
37		−1	
40		0	−1¼°
40	39	−2	
40		−2	
63		−1	
63	74°	−1	−0½°
83		+1	
88		−1	
111		−2	
149		+1	
189	165°	+3	+1¾°
189		+3	
189		+3	
(212		+17)	
218		+1	
224		0	
240		0	
242		+5	
242	238°	+1	+2½°
242		+2	
242		+2	
246		+6	
246		+6	
323		0	
324	327°	−3	−1°
335		0	

We now perceive symmetry, and a little further inquiry shows us that the zodiacal light does not follow the ecliptic as we had supposed from casual observation, but that it closely follows the invariable plane of the solar system.

This plane not only has a mathematical conception, but it may also be regarded as the original plane of the solar system, throughout which was scattered all the matter subsequently condensed into the sun and planets.

Employing the more recently determined values of the masses of the planets, I find for the invariable plane for 1900:

Inclination to ecliptic	1° 35′ 2″
Longitude of ascending node	106° 52′ 37″

Table 6 gives the latitudes of points on the invariable plane corresponding to points taken at every 10° along the ecliptic.

It will be seen that these observations show that the zodiacal light closely follows the invariable plane, except at about longitude 238°; and the discordance here is probably due to trouble caused by the brightness of the planet Venus in the early mornings of January 21 and 22, 1899.

In the Monthly Notices of the Royal Astronomical Society, vol. 58, Mr. Maunder published some observations he made of the zodiacal light in Egypt at the end of the year 1897 and the beginning of 1898.

TABLE 6.—*Location of the invariable plane for 1900.*

Longitude.	Latitude.	Longitude.	Latitude.
°	° ′	°	° ′
0............	−1 31	180............	+1 31
10............	1 34	190............	1 34
20............	1 35	200............	1 35
30............	1 33	210............	1 33
40............	1 27	220............	1 27
50............	1 20	230............	1 20
60............	1 09	240............	1 09
70............	0 57	250............	0 57
80............	0 43	260............	0 43
90............	0 28	270............	0 28
100............	−0 11	280............	+0 11
110............	+0 05	290............	−0 05
120............	0 22	300............	0 22
130............	0 37	310............	0 37
140............	0 52	320............	0 52
150............	1 05	330............	1 05
160............	1 16	340............	1 16
170............	+1 25	350............	−1 25

I have reduced them as well as I can, and find:

Longitude.	Latitude.
°	°
30..........................	0
188..........................	+3
323..........................	+1

So that the light appeared in Egypt parallel to the invariable plane, but 1½° to the north. There is a tendency in northern latitudes to put the light too far north; even in Jamaica, latitude 18° N., the errors are all that way.

For many years Mr. Backhouse has observed the position of the counterglow as seen from a station on the northeastern coast of England. I have deduced the results in Table 7 from his Table VI, p. 104, in Vol. II of the Publications of the West Hendon House Observatory, Sunderland.

TABLE 7.—*Location of the center of the counterglow—Backhouse.*

Longitude.	Latitude.	Number of observations.	Groups.	
			Longitude.	Latitude.
°	°		°	°
321	+0.5	2		
340	−1.5	1		
351	+0.2	7		
0	+0.6	16		
11	−0.2	15	4...............	+0.4
18	+0.5	11		
29	+1.5	2		
40	+1.4	15½		
50	+2.1	8		
58	+1.3	3		
118	+0.8	2	98..............	+0.9
126	+0.3	3		
138	+0.2	9		
148	+0.6	4		
162	+1.2	6		
169	+0.6	9½		
178	+1.5	3½	181...............	+1.4
190	+1.2	3		
209	+2.5	2		
214	+2.5	1		

At longitude 181° the center of the counterglow coincides with the invariable plane; but at longitudes 4° and 98° it is too far north, as usual. We here have to take into consideration the time of the year, the height of the counterglow above the horizon, and the clearness and darkness of the nights at Sunderland. Unless I am mistaken the observations at longitude 181° would be taken under the best conditions.

I am unable at present to avail myself of the large number of published observations of the zodiacal light, but what we now chiefly require is a good series of observations made in southern latitudes.

It thus appears that the invariable plane still contains such a large quantity of meteoric matter as to reflect back the light of the sun in the form we have described in this article; that the counterglow is due to the "full moon" phase of the particles of matter, and that all the irregularities of light are due to the irregularities in the distribution of the matter.

There is only one point left for explanation, and this is the band-like appearance of the light at distances from the sun of more than 90°.

Many years ago I made a careful reduction of the star gages of the two Herschels in order to eliminate the Milky Way as far as possible, for Proctor had shown that there is good reason for supposing that the Milky Way is an irregular stream of stars at no great distance, comparatively speaking, from our solar system. The results are given in Table 8. The north galactic pole was taken to be at right ascension $12^h\ 47^m$, north polar distance 59° in 1860, and the numbers of stars given are those seen in the field of view of a telescope 15 inches in diameter. I may say that the observations were very irregularly distributed over the heavens; in some of the areas marked off by galactic longitudes and latitudes there were a large number of observations, in others there were none at all.

TABLE 8.—*Herschel's star gages.*

Galactic north polar distance.	Number of stars in field of view.
° °	
0 to 15	No observation made.
15 to 30	5.2
30 to 45	7.0
45 to 60	12.2
60 to 75	21.8
75 to 90	41.1 not on Milky Way. 133.9 on Milky Way.
90 to 105	126.1 on Milky Way. 49.2 not on Milky Way.
105 to 120	27.2
120 to 135	13.4
135 to 150	9.1
150 to 165	6.5
165 to 180	5.7

It will here be seen that the rise in the number of the stars, from about 45 on or near the Galactic equator to 130 on the Milky Way itself, produces that band-like appearance so familiar to us all, and so it is with the zodiacal light—there is somewhat rapid condensation near the invariable plane which produces the same appearance as in the case of the Milky Way.

THE ZODIACAL LIGHT—IS IT METEOROLOGICAL OR ASTRONOMICAL?

In printing the preceding memoir by Mr. Maxwell Hall, on the zodiacal light, we hope to contribute something to the question whether this appearance in the sky is due principally to astronomical or meteorological conditions. For two centuries it was considered to be a purely astronomical phenomenon, and supposed to be a flat disk ring of meteoric matter inside the orbit of Venus; but, as observations increased, the extent of the orbit had to be increased, until finally the very accurate work by Rev. George Jones, carried out during the Wilkes Exploring Expedition around the globe, and published in full in one large volume, established beyond a doubt the fact that the orbits of the meteors must extend beyond the earth's orbit. As this seemed incompatible with the stability of the earth's orbit, efforts were made to reconcile the observations with the hypothesis that we were observing a meteoric ring revolving about the earth, analogous to the inner crêpe or dusky ring of Saturn. But the laws of mechanics forbade the permanent existence of such a ring. Attention was then called to the fact that we have no record of the zodiacal light ever having been observed from the high mountain tops; whence it follows that, in some way or other, this light must have its origin in some condition peculiar to the lower atmosphere. Therefore for many years the zodiacal light has been noted by meteorological observers, especially by those who have some interest in astronomy. The conclusions arrived at by Dr. Maxwell Hall, however, would relegate the phenomenon to the department of astrophysics instead of terrestrial physics, so that the only influence of the atmosphere would be to render obscure the fainter details. If this be so then the light should be visible from the summits of mountains even better and more frequently than from the low lying stations; and we especially commend it to the attention of observers at high stations throughout the world, whether on plateaus or on mountains.—*C. A.*

CORRIGENDA.

MONTHLY WEATHER REVIEW for October, 1905, Vol. XXXIII, No. 10, page 445, first column, line 1; for "August 24" read "August 4". Also in the same column, the first line beneath the dash, for "—4" read "—2".

MONTHLY WEATHER REVIEW for January, 1906, Vol. XXXIV, No. 1, page 14, second column, table at foot: in every case for "*F*" read "*C*"; also page 15, second column, Table 8, at head of each subcolumn make the same change.

MONTHLY WEATHER REVIEW for January, 1906, Vol. XXXIV, No. 1, page 15, first column, line 17, for "cirro-cumulus" read "strato-cumulus." Page 30, second column, line 2, beneath title "Tornadoes," etc., for "Wake County, N. C.," read "Rowan County, N. C."

MONTHLY WEATHER REVIEW for March, 1906, page 111, second column, line 2, for

$$\frac{1}{z}\int_{z_0}^{z} T = T_m, \text{ and } \frac{T_m}{T_0} = (1 + 0.367\,\theta) = (1 + a\theta),$$

read

$$\frac{1}{z - z_0}\sum_{z_0}^{z} T_z = T_m, \text{ and } \frac{T_m}{T_0} = (1 + 0.367\theta) = (1 + a\theta).$$

Page 114, first column, formulas (42) and (43), and the text below, change the expressions for angular velocity from $(2n+\nu)$ to $(2\omega+\nu)$.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

North Atlantic weather was notably severe. During the first half of the month low barometric pressure prevailed over the British coasts and the barometer continued high over the Azores. During the last half of the month an area of high barometer persistently covered the British Isles, and low barometric pressure and stormy weather prevailed from the region of the Azores eastward over southwestern Europe.

In the United States the course and character of areas of high and low barometric pressure produced strikingly abnormal weather. Temperature was generally deficient, and in an area extending from the lower Ohio Valley over the middle-eastern slope of the Rocky Mountains the deficiency was 9° to 10° F. Except on the north Pacific coast and in limited areas east of the Rocky Mountains precipitation was in excess of the March average, and in interior portions of the middle and east Gulf States, Georgia, and northern California the excess exceeded four inches. Southern and eastern districts were visited by a number of storms of unusual severity, and the second decade of the month covered a period of exceptionally low temperature and heavy snow in an area extending from Lake Superior over the Missouri Valley and the middle and northern Rocky Mountain and Plateau districts.

From the 1st to 4th an area of low barometer advanced from Colorado to the Canadian Maritime Provinces, attended by heavy snow in the Middle-western and Northwestern States on the 1st and in the Missouri Valley and the northern Lake region on the 2d, and by heavy rain from the southern Lake region and the Ohio Valley to the east Gulf and south Atlantic

coasts on the 3d. Among other prominent features noted in connection with this storm were barometric pressure below 29.00 inches in Colorado on the 1st, a well-defined tornado at Meridian, Miss., the evening of the 2d, and high winds on the New England coast. From the 3d to the 10th a storm advanced from the middle Plateau to the Gulf of Mexico, and passed thence northeastward to the Canadian Maritime Provinces, with barometric pressure falling to a reported minimum of 28.52 inches at Chatham, N. B., on the morning of the 10th. Heavy rain fell in the east Gulf and South Atlantic States the night of the 7-8th, and a severe northeast shifting to northwest gale began on the New England coast the night of the 8th, and continued through the 9th and 10th. From the 9th to 12th a storm advanced from the north Pacific coast southeastward over the Rocky Mountain districts and central valleys, and thence northeastward to the Gulf of St. Lawrence, attended on the 10th and 11th by heavy snow from the northern Plateau over the middle and northern Rocky Mountain districts, the Missouri, upper Mississippi, and Ohio valleys, and the lower Lakes.

During the second decade of the month barometric pressure continued low over the middle Plateau, and the passage from that region across the Southern and Eastern States of areas of low barometer was attended by the most widespread storms of the season. Heavy rain fell during this period in southern and heavy snow in northern districts from the Atlantic to the Pacific, extremely cold weather prevailed from the middle and northern Plateau regions over the Missouri Valley and the upper Lake region, and northeast to northwest gales occurred on the middle Atlantic and New England coasts.

From the 23d to 27th a storm moved from the north Pacific coast to the Gulf of St. Lawrence, attended by general rains throughout its course, and on the 26th by heavy rains and thunderstorms in the lower Missouri and middle and upper Mississippi valleys. The last important storm of the month appeared over Colorado on the 26th, moved thence southeastward to the Gulf of Mexico, and then northeastward, and passed off the middle Atlantic coast during the 31st. This storm was attended by heavy rain in the Gulf, Middle Atlantic, and New England States, and the Ohio Valley. At the close of the month a barometric depression from the north Pacific coast occupied the region north of Montana.

The heavy rains of the second and third decades of March caused high water in the streams of California, and on the 31st the Mississippi and Ohio rivers and tributaries were rising rapidly.

From the 1st to the 5th and during a greater portion of the second decade of the month very low temperature prevailed generally over the United States, the severest cold in interior, northern, and northwestern sections being experienced from the 10th to 15th. This period of cold weather culminated on the 14th, when temperature 20° to 30° below zero was registered in the upper Missouri Valley, and zero temperature from Wyoming over Minnesota and upper Michigan. At the close of the second decade the interior of Texas, the middle and east Gulf coasts, and extreme northern Florida were visited by heavy frost. From the 21st to 23d a moderate cold wave advanced from the British Northwest Territory eastward over the northern districts. After the 23d no well-defined cold wave appeared.

BOSTON FORECAST DISTRICT.

In New England there was a prevalence of low temperature, with heavy snowfall and several severe storms The snowfall was unusually heavy in all sections, and in amount exceeded the total fall of the preceding winter months. The severe storms of the month were those of the 9-10th, 15-16th, and 19-20th, all of which caused more or less damage to shipping with considerable loss of life along the coast, the last one being one of the most destructive for many years, and by many considered the worst storm since the so-called "blizzard" of March 11-13, 1888. According to published reports six lives were lost and fourteen vessels were wrecked or damaged on the New England coast during this great storm. The heavy snow of the month was very favorable for lumbering interests, and the low temperature for the harvesting of ice. Ample warnings were issued for all storms and cold waves, and none occurred without warnings.—*J. W. Smith, District Forecaster.*

NEW ORLEANS FORECAST DISTRICT.

Over the interior of the west Gulf States the month was stormy and disagreeable. On the coast storm warnings were neither ordered nor required. Cold-wave warnings were issued for a considerable area on the 10th and 11th, and were generally justified. A cold wave moved rapidly into Oklahoma and northwestern Texas on the morning of the 14th, without warnings having been issued. Cold-wave warnings were ordered on that date for Arkansas, northeastern Texas, and northern Louisiana, and the temperature fell 30°, or more, generally over the region indicated. Frost and freezing temperature, for which warnings were issued, extended almost to the coast line on the 20th and 21st.—*I. M. Cline, District Forecaster.*

LOUISVILLE FORECAST DISTRICT.

The month was wet and exceptionally cold, and heavy rains during the latter portion caused rapid rises in the Ohio River and tributaries, with flood stages at many points. Cold-wave warnings were ordered for Kentucky and Tennessee on the mornings of the 11th and 14th, and for central and eastern Tennessee on the morning of the 12th.—*F. J. Walz, District Forecaster.*

CHICAGO FORECAST DISTRICT.

Compared with the preceding winter months March was relatively cold. A few cold-wave warnings were ordered, but no general cold-wave warning for the entire district was issued. On the morning of the 2d heavy snow warnings were issued for Minnesota, Nebraska, eastern South Dakota, and northwestern Iowa, and considerable snow with strong winds followed over the area covered by the advices. Winter navigation continued to a limited degree on Lake Michigan, and the companies operating steamers were advised from time to time before impending storms. Steamers coming into Chicago Harbor were delayed considerably on March 26 by ice that had been driven to the southern end of the lake by northerly winds.—*H. J. Cox, Professor and District Forecaster.*

DENVER FORECAST DISTRICT.

Except in extreme southern portions of Arizona and New Mexico the month was much colder than usual, and in Wyoming and eastern Colorado it was the coldest March on record. Precipitation was in excess, except in extreme southern New Mexico; and in western Wyoming, western Colorado, southern Utah, and northern Arizona the amounts reported were the greatest on record. The greatest part of the precipitation was in the form of wet snow, resulting in numerous snow slides in the San Juan district in southwestern Colorado, which blockaded for weeks the railroad in the Canyon of the Animas, between Durango and Silverton, besides sweeping away many mining buildings and causing the death of the occupants. The melting of the heavy snow in Wyoming, during the warm spell that followed the cessation of the prolonged storm, taxed the streams, many of which overflowed their banks, with the loss of a number of bridges. Ten lives were lost and a number of persons were injured as the result of the washing away of a railroad bridge in eastern Wyoming. The greatest amount of precipitation fell from the 10th to the 18th, inclusive, during which period an area of low barometer persisted west of the mountains.—*F. H. Brandenburg, District Forecaster.*

SAN FRANCISCO FORECAST DISTRICT.

A disturbance that appeared on the north Pacific coast on the 2d developed considerable intensity. From the 5th to

10th pleasant weather prevailed. During a great portion of the second decade of the month a barometric depression occupied the middle Plateau region, causing high southwest winds and heavy rain, and snow in the mountains. Warnings of high winds and a decided fall in temperature were issued on the 12th. A succession of storms marked the last decade of the month.—*A. G. McAdie, Professor and District Forecaster.*

PORTLAND FORECAST DISTRICT.

The special feature of the month in the North Pacific States and Idaho was a cold spell during the second decade. During the first two or three days of this period high northeast winds and snow prevailed. Warnings were ordered for three storms and were justified in each instance. Cold-wave warnings were ordered in southeastern Idaho on the 12th and were justified.—*E. A. Beals, District Forecaster.*

RIVERS AND FLOODS.

During the month three periods of heavy rains were followed by floods in the watersheds affected. The first district visited was the southeast on the 18th and 19th, and by the 20th and 21st flood stages were general, except in the Carolinas and northeastern Georgia, where the rivers were not above the danger lines as a rule. The usual warnings were issued in all cases.

The flood in the Ocmulgee River, while not at all unusual as far as the actual stages of water were concerned, was nevertheless a very trying one from the fact that it was the fourth in about four months, and the second within a week. The warnings, of course, enabled citizens to remove or protect portable property, but damage to fixed improvements could not be prevented.

The frequent occurrence of these floods has determined the commercial and agricultural interests in the vicinity of Macon, Ga., to protect themselves from further loss, and preliminary arrangements are in progress for the construction of a substantial levee to extend southward from Macon for a distance of about five miles.

The Flint River rise was not pronounced, but in the Chattahoochee danger-line stages were common, although no great damage resulted.

In the watershed of the Alabama River the floods were quite severe with stages from 3 to 8 feet above the danger lines in the Coosa and Tallapoosa rivers, and 15 feet above in the Alabama. Preliminary warnings had been issued on the 15th on account of the heavy rains of the 14th over the northern portions of Georgia and Alabama, and, as heavy rains were again falling, additional warnings were sent out on the 19th, owners of property subject to overflow being advised to remove or protect the same. Railroad repair trains were immediately dispatched to points exposed to floods, live stock was driven from the bottoms, and goods and merchandise were removed from storehouses and basements that were afterwards flooded. The warnings were accurate in every detail and were especially commended by the press and all others interested. The conditions were very similar over the Black Warrior and lower Tombigbee rivers; stages from 15 to 20 feet above the danger lines were forecast, with excellent verification, and the warnings were instrumental in saving a large amount of property. Additional warnings became necessary on the 28th and 29th for continued high stages that persisted for several days after the end of the month. The flood waters covered the lowlands along the Black Warrior, and those along the Tombigbee for a distance of 25 miles above Demopolis, Ala. Near the confluence of the two rivers the water extended five miles beyond the river bed, all steamboat landings were submerged, and flatboats were used for transferring freight from the steamboats to the higher lands. To the lumber and milling interests, however, the floods were a distinct benefit, as these were enabled to move timber that had been cut for the market.

The floods in southeastern Mississippi were also of decided proportions. Stages at the river stations were as follows:

Station.	River.	Stage.	Danger line.
Hattiesburg, Miss.	Leaf	20.5	20
Enterprise, Miss.	Chickasawhay	29.4	18
Shubuta, Miss.	Chickasawhay	39.6	25
Merrill, Miss.	Pascagoula	21.7	20
Jackson, Miss.	Pearl	29.6	20
Columbia, Miss.	Pearl	23.0	14

Warnings were first issued on the 19th, and were supplemented by others whenever necessary. The stages forecast were reached within a fraction of a foot, and no reports of serious damage have been received.

The moderate floods of the last week of the month in the interior rivers of Ohio were due to the melting of the large quantity of accumulated snow that had fallen earlier in the month, assisted by a fair rainfall on the 25th and 26th. Some lowlands were overflowed, but no serious damage was reported.

The accuracy of the warnings that were issued for this flood has demonstrated that flood forecasts for the smaller rivers of Ohio can be made with gratifying exactness. The single disturbing factor was the uncertainty as to the weight that should be given to the melted snow; the usual estimates made from measurements of unmelted snow are often very misleading, and for precise work it is essential that the water equivalent of accumulated snowfall be determined at frequent intervals by exact measurements.

The rises in the Mississippi and Ohio rivers were caused by the heavy rains of the 25th and 26th, and of the 29th and 30th, and were still in progress at the end of the month. They will be described in the MONTHLY WEATHER REVIEW for April, 1906.

It has been ascertained from press reports that the melting snow floods in the rivers of Wyoming were much more severe than usual, resulting in considerable damage to railroads, etc., and great losses to stockmen. No river and flood service is maintained in Wyoming.

The California rains from the 20th to the 26th, inclusive, were followed by steadily rising waters over the Sacramento and San Joaquin watersheds. To the rain waters were added those coming from the melting of the deep snows on the mountains, causing destructive floods in many localities. The stages reached were not exceptionally high, but the resulting damage was widespread, without, however, any special instances of unusual character, except the complete interruption of railroad traffic for some time in southern California. The levees, with but one or two unimportant exceptions, remained intact. Warnings of the dangerous character of the floods were issued on the 23d, 24th, and 26th.

At the end of the month the rivers were practically free from ice except the Mississippi from Dubuque northward and the rivers of northern New England. The upper Missouri opened during the last few days of the month.

The highest and lowest water, mean stage, and monthly range at 307 river stations are given in Table VI. Hydrographs for typical points on seven principal rivers are shown on Chart I. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Professor of Meteorology.*

CLIMATOLOGICAL SUMMARY.

By Mr. JAMES BERRY, Chief of the Climatological Division.

TEMPERATURE AND PRECIPITATION BY SECTIONS, MARCH, 1906.

In the following table are given, for the various sections of the Climatological Service of the Weather Bureau, the average temperature and rainfall, the stations reporting the highest and lowest temperatures with dates of occurrence, the stations reporting greatest and least monthly precipitation, and other data, as indicated by the several headings.

The mean temperatures for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperature and precipitation are based only on records from stations that have ten or more years of observation. Of course the number of such records is smaller than the total number of stations.

Section.	Temperature—in degrees Fahrenheit.								Precipitation—in inches and hundredths.					
	Section average.	Departure from the normal.	Monthly extremes.						Section average.	Departure from the normal.	Greatest monthly.		Least monthly.	
			Station.	Highest.	Date.	Station.	Lowest.	Date.			Station.	Amount.	Station.	Amount.
Alabama	51.6	−4.6	Lucy	85	23	Valley Head	20	21	9.26	+3.94	Demopolis	15.78	Lucy	3.80
Arizona	54.4	0.0	Roosevelt	92	31	Flagstaff (*a*)	1	2	1.97	+0.69	Flagstaff (*b*)	6.41	Gilabend	0.03
Arkansas	45.2	−7.2	Centerpoint	88	26	Harrison	10	20	5.69	+0.04	Corning	9.27	Fort Smith	3.33
California	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Colorado	30.7	−4.6	Holly	89	26	Antelope Springs	−34	19	2.50	+0.98	Silverton	10.04	Manassa	0.20
Florida	62.8	−2.6	Orange City	92	29	Molino	24	21	3.24	−0.20	Molino	8.29	Jacksonville	1.03
Georgia	52.2	−4.1	St. George	86	29	Clayton	15	21	6.23	+1.11	Newnan	13.77	Valona	0.92
Hawaii	67.2†	....	Waialua, Oahu	91	12	Humuula, Hawaii	30	5, 6, 13	3.44‡	....	Honomanu Val., Maui	15.37	Naalehu, Hawaii	0.24
Idaho	31.2	−4.1	Lewiston	71	29	Soldier	−35	17	2.24	+0.58	Blackfoot	4.45	Porthill	0.20
Illinois	31.2	−7.5	New Burnside	66	8	Philo	−13	17	3.93	+0.55	Equality	6.88	Antioch	0.60
Indiana	31.9	−7.6	Madison	67	26	Northfield	−8	18	5.16	+1.41	Bloomington	9.31	Hammond	0.89
Iowa	27.1	−5.7	Pacific Junction	65	1	Thurman	−14	17	2.34	+0.46	Burlington	4.55	Ames	0.58
Kansas	33.1	−8.6	Englewood	83	25	Burr Oak	−15	17	1.61	+0.04	Columbus	3.47	Scott	0.45
Kentucky	39.2	−7.6	Earlington Shelbyville	75 75	11 26	Maysville	3	1	6.37	+1.19	Mount Sterling	9.10	Williamsburg	2.62
Louisiana	56.8	−3.9	Melville St. Francisville	86 86	8 27	Oxford	22	20	6.81	+2.09	Clinton	16.18	Morgan City	2.24
Maryland and Delaware	36.9	−5.1	Great Falls, Md	68	27	Oakland, Md	−8	18	4.97	+1.32	Bachmans Valley, Md	7.18	Westernport, Md	2.22
Michigan	24.4	−4.4	Coldwater	63	26	Humboldt	−35	23	2.00	−0.26	Whitefish Point	3.68	Harbor Beach	0.55
Minnesota	20.6	−4.5	New Ulm	61	29	Bagley	−33	14	1.20	−0.25	Peterson	3.17	Angus	0.10
Mississippi	52.0	−5.1	Waynesboro	86	24	Ripley	23	21	8.51	+2.67	Enterprise	14.76	Pittsboro	3.88
Missouri	34.6	−9.2	Joplin	75	26	Bethany Sublett	−5 −5	17 17	3.93	+0.46	Koshkonong	8.83	St. Joseph	1.43
Montana	24.8	−3.8	St. Pauls	79	31	Fort Logan	−45	15	0.79	−0.17	Absarokee	2.95	Ridgelawn	0.00
Nebraska	26.1	−8.4	Red Cloud	74	1	Agate	−28	16	1.87	+0.77	Hayes Center	4.42	Ashton	0.20
Nevada	38.5	−0.1	Martins Ranch	83	9	San Jacinto	−15	16	1.68	+0.35	Morey	6.16	2 stations	T.
New England*	27.7	−4.1	3 stations	58	3 dates	Van Buren, Me	−27	25	3.16	+0.80	Rockport, Mass	9.08	Burlington, Vt	1.75
New Jersey	34.4	−3.6	Imlaystown Oceanic	62 62	4 27	Layton	−15	24	5.09	+1.06	New Brunswick	6.77	Cape May City	2.91
New Mexico	44.5	−0.1	Lordsburg	87	31	Chama	−8	19	0.73	+0.22	Fort Wingate	4.80	7 stations	0.00
New York	26.4	−4.9	Elmira	68	27	Paul Smiths	−20	25	3.42	+0.41	Boyds Corners	7.05	Avon	1.26
North Carolina	46.1	−3.8	4 stations	80	12, 30	Pink Beds	5	21	5.83	+0.69	Sapphire	11.92	Saxon	3.85
North Dakota	18.5	+0.6	Medora	67	31	Berthold Agency Williston	−34 −34	14 14	0.38	−0.57	Wishek	2.00	6 stations	T.
Ohio	31.3	−6.9	Ironton	74	26	Bladensburg	−12	23	3.97	+0.61	Portsmouth	6.95	Napoleon	1.80
Oklahoma and Indian Territories.	42.0	−8.1	Chattanooga, Okla	83	26	Harrington, Okla	2	12	2.35	+0.04	Wagoner, Ind. T	6.48	Chattanooga, Okla	0.08
Oregon	40.6	−1.6	Fairview	81	9	Granite	−23	16	2.95	−1.78	Gold Beach	12.04	Umatilla	0.48
Pennsylvania	31.7	−5.3	Derry Station	68	30	Lewisburg Saegerstown	−13 −13	24 23	4.46	+0.96	Gordon	7.37	Erie	2.76
Porto Rico	74.2	....	Manati	95	30	Adjuntas	47	22	3.99	....	Manati	8.13	Santa Isabel	0.39
South Carolina	51.6	−2.9	3 stations	82	12, 14	Greenville	18	21	5.34	+1.41	Walhalla	10.25	St. Matthews	3.26
South Dakota	22.3	−6.5	Oelrichs	75	31	Grand River School	−27	14	1.20	−0.10	Mitchell	3.45	Mound City	0.20
Tennessee	44.1	−5.1	3 stations	76	29	3 stations	12	21	5.43	−0.29	Dyersburg	8.08	Elizabethton	2.46
Texas	54.0	−3.7	Eagle Pass	97	27	Texline	7	19	1.72	−0.35	Longview	7.91	Kent	0.00
Utah	38.0	−0.3	Grayson	86	31	Strawberry Valley	−34	19	3.14	+1.42	Ranch	12.02	Lucin	0.15
Virginia	40.2	−5.3	Big Stone Gap (*a*)	71	30	Dale Enterprise Woodstock	8 8	1 1	4.65	+0.69	2 stations	6.35	Mendota	2.99
Washington	40.4	−0.5	Kennewick	85	80	Bonita	−12	13	1.54	−1.43	Loverings Ranch	5.22	Colville	0.02
West Virginia	37.3	−5.2	Bancroft	75	3	Cuba	−7	1	4.77	+0.68	Buckhannon	8.11	Wheeling	1.98
Wisconsin	24.1	−6.1	Koepenick	75	31	Minocqua	−32	15	2.32	+0.38	Sturgeon Bay	7.18	New Richmond	0.48
Wyoming	21.6	−7.3	Hyattville	75	31	Snake River, Y. N. P.	−50	17	2.29	+0.84	South Pass City	5.40	Cambria	0.45

* Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut. † 47 stations, with an average elevation of 772 feet. ‡ 137 stations.

THE WEATHER OF THE MONTH.

By Mr. WM. B. STOCKMAN, Chief of the Division of Meteorological Records.

The distribution of atmospheric pressure conducive to the mild and comparatively dry weather of January and February, 1906, gave way early in March to decidedly wet and wintry conditions, which continued with slight intermissions throughout the month, and as a whole the reputation of the month for sudden and marked changes in weather conditions was more than sustained.

The weather of the month was dominated largely by a marked and persistent area of high pressure central over the northern slope region and the Dakotas, which, extending eastward and westward over the northern tier of States with decided positive departures, markedly influenced the weather in all districts.

To the east, south, and west of the center of highest pressure, under the influence of the generally northerly winds blowing from the above region, the temperature was markedly lowered, and the averages for the month over the central Rocky Mountain and Plains region and the lower Missouri and central Mississippi valleys were in many cases the lowest on record for this month. The minimum temperatures, as a rule, were not unusually low, except over the extreme northwest, including the States of Washington, Oregon, and Idaho, where from the 12th to 17th inclusive, remarkably low temperatures prevailed, giving at many points values lower than any previously recorded in March.

In marked contrast to the above temperature conditions prevailing over the United States, the Canadian Northwest Provinces, under the influence of southerly winds, were generally free from severe storms and cold waves, with temperatures considerably above the average.

Average temperatures and departures from normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	9	29.4	− 2.3	+ 5.1	+ 2.6
Middle Atlantic	13	36.8	− 2.8	+ 1.8	+ 0.9
South Atlantic	10	51.5	− 2.1	− 2.0	− 1.0
Florida Peninsula*	8	64.5	− 1.0	− 2.2	− 1.1
East Gulf	8	53.9	− 3.4	− 7.4	− 3.7
West Gulf	7	53.6	− 4.2	− 4.0	− 2.0
Ohio Valley and Tennessee	12	38.0	− 5.6	− 3.4	− 1.7
Lower Lake	8	28.2	− 4.1	+ 3.7	+ 1.8
Upper Lake	10	23.6	− 3.4	+ 5.6	+ 2.8
North Dakota*	8	19.0	− 1.0	+10.2	+ 5.1
Upper Mississippi Valley	13	28.4	− 6.6	+ 0.6	+ 0.3
Missouri Valley	11	27.9	− 7.4	+ 5.1	+ 2.6
Northern Slope	7	24.3	− 7.5	+ 7.8	+ 3.9
Middle Slope	6	33.2	− 8.9	+ 2.5	+ 1.2
Southern Slope*	6	44.3	− 6.3	− 2.6	− 1.3
Southern Plateau*	13	49.5	+ 0.6	+ 6.5	+ 3.2
Middle Plateau*	8	37.7	− 0.1	+ 4.3	+ 2.2
Northern Plateau*	12	34.0	− 3.4	+ 5.2	+ 2.6
North Pacific	7	44.6	− 0.5	+ 6.3	+ 3.2
Middle Pacific	5	51.7	− 0.6	+ 6.3	+ 3.2
South Pacific	4	56.0	+ 0.5	+ 6.6	+ 3.3

* Regular Weather Bureau and selected cooperative stations.

In Canada.—Prof. R. F. Stupart says:

The temperature exceeded the average from the Pacific coast to the Rainy River district of Ontario, and was subnormal in all other portions of Canada. The excess amounted to from 1° to 2° in British Columbia and from 3° to 5° in the Northwest Provinces. A deficiency of from 1° to 8° occurred in Ontario and Quebec, and from 1° to 4° in the Maritime Provinces.

Precipitation was generally in excess of the average, except over the north Pacific coast, along the northern border, in Texas, and along the south Atlantic coast.

Under the influence of the high pressure and cold over the northern Rocky Mountain and Plains region, with low pressure over the Southwest, conditions were favorable for the occurrence of heavy precipitation over the southern Rocky Mountain region, and the middle and southern Pacific coasts.

In the area from southern Idaho and Wyoming, southward to and including northern Arizona and New Mexico, and over the whole of California, heavy, and in some cases abnormal amounts of precipitation were recorded. At numerous points in California, and also at points in Utah and Arizona, the monthly amounts were greater than previously recorded in March. Precipitation was also decidedly in excess in central Georgia, the greater part of Alabama and Mississippi and over the lower Ohio Valley.

The snowfall for the month, as to area covered and amounts recorded, was far in excess of the average. Over the central valleys from Kansas and Nebraska eastward to the Appalachian Mountains the amounts for the month were unusually heavy, and during the storm of the 18th-19th the depths of fall at many points were greater than any previously recorded in a single storm, and in some cases more than previously recorded in an entire month. Over much of the southern Rocky Mountain region the snowfall was exceptionally heavy.

By the end of the month, however, the snow had practically disappeared from all sections, except over northern New England, the northern peninsula of Michigan, northern Wisconsin, and Minnesota, and at the higher elevations in the mountain districts.

Average precipitation and departure from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		*Inches.*	*Inches.*
New England	9	5.05	131	+1.2	−0.6
Middle Atlantic	13	4.21	110	+0.4	−1.4
South Atlantic	10	3.82	86	−0.6	−1.5
Florida Peninsula*	8	3.27	110	+0.3	+1.5
East Gulf	8	8.56	146	+2.7	−0.7
West Gulf	7	2.61	77	−0.8	−3.5
Ohio Valley and Tennessee	12	5.29	123	+1.0	−3.1
Lower Lake	8	2.72	104	+0.1	−2.7
Upper Lake	10	2.20	105	+0.1	+0.3
North Dakota*	8	0.36	42	−0.5	−0.6
Upper Mississippi Valley	13	2.81	122	+0.5	+1.0
Missouri Valley	11	2.34	134	+0.6	+0.7
Northern Slope	7	1.54	183	+0.7	+0.3
Middle Slope	6	1.66	122	+0.3	−0.4
Southern Slope*	6	0.95	100	0.0	−0.7
Southern Plateau*	13	2.23	245	+1.4	+1.0
Middle Plateau*	8	2.36	223	+1.3	+1.5
Northern Plateau*	12	1.65	114	+0.2	−0.2
North Pacific	7	2.10	40	−3.1	−4.9
Middle Pacific	5	8.05	199	+4.0	+4.3
South Pacific	4	6.75	300	+4.5	+5 2

*Regular Weather Bureau and selected cooperative stations.

In Canada.—Professor Stupart says :

The precipitation exceeded the average over eastern Quebec and the Maritime Provinces and also over the greater portion of Ontario and locally in western Quebec; elsewhere it was deficient. The deficiency was pronounced in Alberta and Saskatchewan, where in many districts there was an entire absence of either rain or snow.

In British Columbia large negative departures occurred over the lower mainland and Vancouver Island districts.

At the close of the month the mountains in British Columbia were nearly clear of snow, and in the Northwest Provinces there was practically no snow on the ground. Portions of northern Ontario reported a depth of about 10 inches, and in Quebec the covering of snow varied from a trace at Montreal to 30 inches at Father Point. In the Maritime Provinces the ground was bare in most of the southern districts, while a considerable depth was on the ground in northern New Brunswick.

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Amarillo, Tex	2	60	nw.	North Head, Wash	23	58	se.
Atlanta, Ga	19	50	w.	Oklahoma, Okla	1	50	s.
Block Island, R. I	1	50	nw.	Do	2	54	w.
Do	10	54	w.	Pensacola, Fla	29	50	sw.
Do	15	56	ne.	Pittsburg, Pa	21	54	w.
Do	19	55	e.	Point Reyes Light, Cal	1	55	nw.
Do	22	54	w.	Do	2	61	s.
Buffalo, N. Y	21	60	sw.	Do	3	68	s.
Do	22	55	sw.	Do	11	62	s.
Cleveland, Ohio	21	54	w.	Do	12	61	s.
Columbus, Ohio	21	54	sw.	Do	17	50	nw.
Do	22	56	sw.	Do	20	57	s.
Dodge, Kans	1	52	se.	Do	23	63	s.
Duluth, Minn	2	56	ne.	Do	25	50	s.
Eastport, Me	9	52	ne.	Do	30	70	nw.
Do	20	65	e.	Do	31	74	nw.
El Paso, Tex	1	50	w.	Port Crescent, Wash	10	55	ne.
Do	18	51	w.	Do	11	60	ne.
Grand Haven, Mich	21	54	nw.	Do	12	56	ne.
Key West, Fla	29	56	nw.	St. Paul, Minn	21	50	nw.
Do	31	56	w.	Salt Lake City, Utah	13	60	nw.
Lincoln, Nebr	8	50	nw.	Sand Key, Fla	8	53	w.
Madison, Wis	30	53	ne.	Do	29	60	nw.
Minneapolis, Minn	21	52	nw.	Do	31	52	w.
Modena, Utah	11	52	sw.	Sioux City, Iowa	8	54	w.
Do	12	60	sw.	Do	21	58	nw.
Do	13	52	sw.	Southeast Farallon, Cal	2	51	s.
Do	31	50	sw.	Do	3	56	s.
Mount Tamalpais, Cal	12	71	sw.	Do	11	53	s.
Do	31	51	nw.	Do	20	53	se.
Nantucket, Mass	4	56	sw.	Do	23	55	se.
Do	9	60	ne.	Syracuse, N. Y	26	50	s.
Do	15	52	e.	Tatoosh Island, Wash	3	50	s.
Do	19	60	e.	Do	10	60	ne.
New York, N. Y	10	64	w.	Do	11	66	ne.
Do	20	60	w.	Winnemucca, Nev	12	54	se.
Do	22	52	w.				

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	70	— 5	Missouri Valley	78	+ 6
Middle Atlantic	74	+ 2	Northern Slope	75	+ 8
South Atlantic	76	+ 1	Middle Slope	75	+15
Florida Peninsula	78	+ 1	Southern Slope	60	+10
East Gulf	77	+ 4	Southern Plateau	51	+12
West Gulf	74	+ 2	Middle Plateau	66	+10
Ohio Valley and Tennessee	77	+ 6	Northern Plateau	72	+ 4
Lower Lake	80	+ 4	North Pacific	74	— 6
Upper Lake	78	— 1	Middle Pacific	78	+ 2
North Dakota	78	0	South Pacific	75	+ 4
Upper Mississippi Valley	78	+ 5			

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	5.5	— 0.1	Missouri Valley	6.8	+ 1.2
Middle Atlantic	6.6	+ 1.1	Northern Slope	5.2	— 0.1
South Atlantic	5.5	+ 0.8	Middle Slope	6.4	+ 2.0
Florida Peninsula	4.8	+ 0.8	Southern Slope	4.6	+ 0.4
East Gulf	6.2	+ 1.5	Southern Plateau	4.3	+ 0.6
West Gulf	5.9	+ 0.7	Middle Plateau	5.9	+ 0.6
Ohio Valley and Tennessee	7.5	+ 1.6	Northern Plateau	5.8	— 0.9
Lower Lake	7.2	+ 0.8	North Pacific	6.7	+ 0.1
Upper Lake	6.0	+ 0.1	Middle Pacific	6.6	+ 1.6
North Dakota	5.5	0.0	South Pacific	5.8	+ 1.3
Upper Mississippi Valley	7.1	+ 1.6			

DESCRIPTION OF TABLES AND CHARTS.

By Mr. WM. B. STOCKMAN, Chief of the Division of Meteorological Records.

For description of tables and charts see page 38 of REVIEW for January, 1906.

TABLE I.—*Climatological data for U. S. Weather Bureau stations, March, 1906.*

Stations.	Elevation of instruments: Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Pressure, in inches: Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Temperature of the air, in degrees Fahrenheit: Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches: Total.	Departure from normal.	Days with .01, or more.	Wind: Total movement, miles.	Prevailing direction.	Maximum velocity: Miles per hour.	Direction.	Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness during daylight, tenths.	Total snowfall.
New England.							29.4	− 2.3										70	5.05	+ 1.2										5.6	
Eastport	76	69	85	29.89	29.98	+ .05	25.5	− 3.2	48	27	32	− 1	1	19	27	23	19	77	6.32	+ 1.9	14	11,012	nw.	65	e.	20	10	10	11	5.7	32.5
Portland, Me.	103	81	117	29.91	30.04	+ .08	26.8	− 5.2	49	27	34	5	1	20	25	24	17	68	4.95	+ 1.6	15	8,513	nw.	44	ne.	20	10	13	8	5.1	41.0
Concord	288	70	79	29.73	30.05	+ .05	26.8	− 4.4	54	29	35	− 1	25	19	39	.....	.....	.....	2.11	− 1.4	10	5,518	nw.	29	sw.	22	18	7	6	4.0	16.8
Northfield	876	16	70	29.09	30.08	+ .08	20.6	− 4.4	52	27	30	− 13	24	11	45	18	13	71	2.33	− 0.6	12	6,581	nw.	38	se.	26	9	10	12	5.9	18.5
Boston	125	115	188	29.92	30.06	+ .09	32.4	− 1.8	56	27	40	8	1	25	24	29	23	68	5.45	+ 1.4	12	9,100	w.	41	e.	19	10	11	10	5.3	21.9
Nantucket	12	14	90	30.04	30.05	+ .07	34.0	− 0.9	54	4	40	11	1	28	20	31	26	74	7.41	+ 3.9	18	13,706	sw.	60	e.	19	8	14	9	5.5	10.4
Block Island	26	11	46	30.04	30.07	+ .09	33.6	− 1.2	51	27	39	11	1	28	21	30	25	73	5.71	+ 1.7	15	15,454	nw.	56	ne.	15	8	12	11	5.5	11.2
Narragansett	.....	9	.....	.....	.....	.....	32.4	− 0.9	53	27	40	8	1	25	25	.....	.....	.....	5.49	+ 0.9	14	.....	sw.	.....	.....	.....	13	5	13	.....	11.5
Providence	160	57	67	29.91	30.08	+ .10	32.2	.....	56	29	40	7	1	24	29	28	22	67	4.29	.....	14	6,517	nw.	30	w.	22	10	9	12	5.5	16.9
Hartford	159	122	132	29.91	30.09	+ .10	31.0	.....	53	29	38	7	24	24	33	27	20	64	5.02	.....	13	6,015	n.	37	sw.	22	8	9	14	6.3	15.5
New Haven	106	116	155	29.96	30.09	+ .10	32.6	− 2.0	53	29	40	10	24	25	27	29	23	69	5.67	+ 1.5	14	8,214	w.	40	ne.	15	8	10	13	5.8	19.0
Mid. Atlantic States.							36.8	− 2.8										74	4.21	+ 0.4										6.6	
Albany	97	102	115	30.00	30.11	+ .10	28.2	− 3.7	49	27	35	3	25	21	33	25	20	72	2.54	− 0.1	10	6,197	n.	31	s.	27	7	12	12	5.8	15.8
Binghamton	875	79	90	29.14	30.10	+ .08	27.2	− 3.6	52	27	34	− 3	25	21	40	.....	.....	.....	3.22	+ 0.2	12	5,056	nw.	28	sw.	22	4	6	21	7.6	20.9
New York	314	108	350	29.74	30.09	+ .09	34.9	− 2.0	55	27	41	16	24	29	20	32	27	72	5.58	+ 1.6	12	12,017	nw.	64	w.	10	7	12	12	6.4	13.4
Harrisburg	374	94	104	29.70	30.12	+ .09	33.6	− 2.6	54	27	39	14	24	28	19	30	24	72	3.25	− 0.2	10	6,468	w.	39	w.	10	6	10	15	6.6	15.4
Philadelphia	117	116	184	29.98	30.11	+ .09	36.7	− 2.4	58	3	43	16	24	31	24	33	26	66	5.59	+ 2.3	16	8,097	nw.	36	w.	10	9	6	16	6.5	9.1
Scranton	805	111	119	29.20	30.09	+ .07	30.5	.....	52	27	37	5	24	24	29	27	22	74	4.48	.....	14	6,257	sw.	36	w.	10	7	7	17	6.8	22.3
Atlantic City	52	37	48	30.05	30.11	+ .09	37.0	− 0.6	54	27	43	17	24	31	20	33	29	74	6.30	+ 2.4	14	7,372	ne.	30	sw.	15	6	8	17	6.8	5.3
Cape May	17	48	52	30.10	30.12	+ .11	37.6	− 1.9	54	3	43	20	24	32	18	34	.....	.....	2.91	− 1.5	16	7,658	ne.	35	ne.	10	7	11	13	6.4	5.5
Baltimore	123	69	117	29.97	30.11	+ .08	37.6	− 3.9	65	27	44	20	24	31	23	.....	.....	68	4.63	+ 0.5	16	6,842	nw.	31	w.	10	6	4	21	7.5	11.2
Washington	112	59	76	29.98	30.11	+ .07	37.6	− 3.7	62	27	44	18	1	31	25	33	27	68	4.62	+ 0.5	15	6,306	nw.	42	w.	20	6	11	14	6.5	7.3
Cape Henry	18	11	58	30.06	30.08	+ .05	44.4	− 0.8	69	27	51	26	1	38	26	.....	.....	.....	3.40	− 1.7	16	12,384	ne.	44	n.	8	9	6	16	6.5	3.0
Lynchburg	681	83	88	29.33	30.10	+ .05	41.2	− 4.0	65	2	50	21	25	33	34	36	31	72	4.93	+ 1.3	12	3,949	ne.	23	nw.	20	8	10	13	6.0	5.2
Mount Weather	1,725	10	57	28.21	30.12	+ .07	30.4	.....	58	27	37	11	24	24	25	28	24	79	3.85	.....	13	12,750	nw.	62	nw.	20	6	6	19	7.0	14.4
Norfolk	91	102	111	30.00	30.10	+ .07	44.8	− 2.1	67	27	52	26	1	37	30	41	38	81	3.97	− 0.6	15	8,078	ne.	36	sw.	3	11	6	14	6.0	4.0
Richmond	144	145	153	29.96	30.12	+ .08	42.0	.....	64	3	50	22	1	34	33	.....	.....	.....	4.78	.....	15	7,021	n.	36	s.	27	9	9	13	6.0	6.4
Wytheville	2,293	40	47	27.64	30.09	+ .04	37.6	− 5.7	66	28	46	17	21	29	35	34	31	84	3.83	0.0	13	5,114	w.	28	w.	22	6	7	18	7.1	8.0
S. Atlantic States.							51.5	− 2.1										76	3.82	− 0.6										5.5	
Asheville	2,255	53	75	27.68	30.09	+ .03	41.9	− 5.1	70	28	51	18	21	33	41	36	30	71	3.62	− 0.6	15	7,863	se.	36	nw.	19	11	9	11	5.6	0.6
Charlotte	773	68	76	29.23	30.09	+ .04	46.8	− 3.1	74	12	55	25	21	38	28	40	35	70	5.17	+ 0.4	12	6,355	ne.	32	sw.	3	9	7	15	6.1	
Hatteras	11	12	47	30.06	30.07	+ .03	50.0	− 0.1	67	30	56	34	21	44	24	48	46	88	5.39	− 0.7	12	13,119	ne.	48	n.	9	14	4	13	5.3	
Raleigh	376	71	79	29.68	30.10	+ .05	46.0	− 2.2	71	12	55	25	1	37	35	40	35	74	5.35	+ 1.3	11	5,722	n.	27	nw.	20	12	6	13	5.7	
Wilmington	78	81	91	29.98	30.07	+ .02	51.8	− 2.1	80	12	61	30	21	43	30	46	42	78	4.48	+ 0.5	13	7,013	ne.	37	sw.	19	10	10	11	5.5	
Charleston	48	14	92	30.03	30.08	+ .02	55.6	− 1.1	77	15	63	33	21	48	23	50	47	82	2.32	− 1.6	8	8,677	s.	37	sw.	19	12	11	8	5.0	
Columbia, S. C.	351	41	57	29.69	30.08	+ .02	51.6	− 2.6	77	12	61	27	21	42	28	46	42	75	5.01	+ 0.5	12	6,349	ne.	30	sw.	3	11	7	13	5.6	
Augusta	180	89	97	29.88	30.08	+ .02	53.2	− 2.3	80	14	63	29	21	42	32	46	41	70	4.33	− 0.9	11	6,013	w.	30	w.	19	10	12	9	5.2	
Savannah	65	81	89	30.02	30.08	+ .02	57.2	− 1.3	79	28	66	32	21	48	28	50	46	77	1.46	− 2.3	7	6,157	sw.	32	sw.	19	10	12	9	5.0	
Jacksonville	43	101	129	30.02	30.07	+ .01	60.6	− 1.4	81	28	69	35	21	52	26	54	51	77	1.03	− 2.4	6	7,665	ne.	48	sw.	10	7	13	11	5.5	
Florida Peninsula.							67.8	− 0.9										78	2.83	+ 0.5										4.8	
Jupiter	24	10	48	30.04	30.06	+ .01	67.8	0.0	80	20	75	46	21	61	28	63	60	78	2.50	− 0.4	12	9,636	se.	40	w.	8	7	18	6	5.1	
Key West	22	10	53	30.03	30.05	.00	71.6	− 1.1	80	3	76	58	21	67	17	66	63	79	3.30	+ 2.1	10	8,885	ne.	56	nw.	29	11	15	5	4.7	
Sand Key	25	40	71	30.01	30.04	− .01	71.4	.....	82	3	75	57	21	68	15	.....	.....	.....	1.29	.....	9	13,463	ne.	60	nw.	29	7	19	5	5.1	
Tampa	35	79	96	30.04	30.08	+ .01	64.0	− 1.5	82	17	73	40	21	55	30	57	54	77	2.70	− 0.1	10	6,776	ne.	35	w.	31	16	7	8	4.3	
East Gulf States.							53.9	− 3.4										77	8.56	+ 2.7										6.2	
Atlanta	1,174	190	216	28.82	30.08	+ .02	47.4	− 4.1	72	29	55	26	21	40	26	42	37	73	10.86	+ 5.1	12	10,877	w.	50	w.	19	9	7	15	6.1	
Macon	370	55	66	29.68	30.09	+ .03	53.6	.....	79	29	64	29	1	43	32	.....	.....	.....	4.87	.....	13	4,344	nw.	23	sw.	30	12	10	9	5.2	
Thomasville	273	8	57	29.80	30.10	+ .04	57.7	.....	80	28	69	30	1	46	36	.....	.....	.....	4.53	− 0.1	10	4,724	s.	34	s.	19	11	11	9	4.8	
Pensacola	56	79	96	30.02	30.08	+ .02	57.0	− 2.5	72	19	64	35	21	50	27	.....	.....	.....	6.66	+ 1.2	11	8,542	se.	50	sw.	29	10	7	14	5.8	
Anniston	741	8	58	29.28	30.09	+ .03	49.5	.....	73	24	60	24	21	39	34	.....	.....	.....	10.98	+ 5.8	14	5,434	se.	29	se.	2	7	5	19	7.3	T.
Birmingham	700	136	144	29.29	30.06	.00	50.9	− 5.7	72	13	59	31	21	42	25	.....	.....	.....	10.49	+ 4.1	11	7,109	nw.	40	se.	18	2	12	17	7.5	
Mobile	57	98	106	30.01	30.07	+ .01	56.4	− 2.5	74	19	64	33	21	49	30	52	48	77	7.16	− 0.4	12	6,296	s.	30	se.	2	6	14	11	5.9	
Montgomery	223	100	112	29.83	30.09	+ .03	53.8	− 3.2	76	24	63	31	21	45	29	49	46	81	10.78	+ 4.3	13	6,030	nw.	32	sw.	14	10	9	12	5.6	
Meridian	375	84	93	29.66	30.07	+ .02	52.2	− 2.3	78	25	61	28	21	43	30	.....	.....	.....	9.42	+ 3.9	11	4,897	sw.	32	w.	2	5	8	18	7.0	
Vicksburg	247	62	74	29.78	30.06	+ .02	54.0	− 4.0	78	25	62	31	20	46	27	48	42	71	9.17	+ 2.7	11	6,368	se.	32	nw.	2	8	10	13	6.3	
New Orleans	51	88	121	30.01	30.06	+ .02	59.5	− 2.5	79	27	68	36	20	51	24	53	53	85	5.53	+ 0.2	10	7,455	s.	29	s.	26	6	12	13	6.3	
West Gulf States.							53.6	− 4.2										74	2.61	− 0.8										5.9	
Shreveport	249	77	84	29.80	30.07	+ .05	52.8	− 4.8	80	25	62	28	20	44	32	46	40	69	3.64	− 1.6	10	6,583	nw.	29	w.	2	9	9	13	6.0	
Fort Smith	457	79	94	29.58	30.07	+ .06	44.3	− 5.7	76	26	52	23	20	36	35	40	34	73	3.33	+ 0.1	12	8,704	e.	38	w.	21	4	9	18	6.9	
Little Rock	357	93	100	29.70	30.09	+ .06	46.0	− 6.2	72	26	54	25	20	38	34	40	34	68	3.64	− 1.6	13	7,928	ne.	35	nw.	19	8	5	18	6.9	
Corpus Christi	20	48	53	30.02	30.04	+ .06	61.4	− 1.4	79	27	68	37	20	54	31	57	53	79	3.65	+ 2.0	10	8,358	se.	33	e.	28	8	9	14	5.8	
Fort Worth	670	106	114	29.35	30.08	+ .10	51.6	.....	88	26	62	26	20	41	41	.....	.....	.....	1.99	.....	7	10,139	nw.	41	s.	1	16	9	6	4.2	
Galveston	54	106	112	30.00	30.06	+ .05	59.0	− 3.5	74	28	64	37	20	54	23	56	55	88	2.05	− 0.9	8	9,889	se.	37	nw.	19	7	12	12	5.9	
Palestine	510	73	79	29.51	30.05	+ .05	53.4	− 4.2	83	27	63	28	20	44	30	49	46	79	1.24	− 2.7	9	7,409	nw.	33	n.	28	7	8	16	6.7	
San Antonio	701	80	91	29.29	30.02	+ .04	58.4	− 3.5	89	27	70	29	20	47	39	50	44	65	1.29	− 0.8	8	6,651	se.	35	nw.	30	13	7	11	5.2	
Taylor	583	55	63	29.43	30.05	+ .06	54.5	.....	87	27	65	26	20	44	40	.....	.....	.....	1.43	.....	9	8,329	n.	32	nw.	30	11	8	12	5.5	
Ohio Val. and Tenn.							36.0	− 5.6										77	5.29	+ 1.0										7.5	
Chattanooga	762	106	112	29.27	30.09	+ .03	47.2	− 3.3	73	29	56	25	21	38	33	41	36	69	4.84	− 1.1	15	6,204	nw.	36	w.	19	6	7	18	6.7	0.2
Knoxville	1,004	35	88	29.00	30.07	+ .01	45.6	− 2.0	76	29	54	23	21	37	36	40	35	74	3.83	− 1.5	15	6,827	sw.	40	w.	19	9	2	20	6.9	T.
Memphis	399	76	97	29.67	30.10	+ .06	44.8	− 6.8	73	25	52	24	20	38	32	41	38	79	5.19	− 0.7	13	8,709	ne.	44	nw.	9	4	8	19	7.3	0.3
Nashville	546	79	91	29.50	30.10	+ .05	43.6	− 5.1	70	11	51	25	17	36	34	39	34	72	6.49	+ 1.3	14	5,468	n.	28	s.	26	8	3	20	7.1	
Lexington	989	75	102	28.98	30.08	+ .03	35.8	− 6.8	66	26	42	13	17	29	32	.....	.....	.....	6.45	+ 1.6	21	9,616	ne.	42	w.	21	4	10	17	7.3	3.6
Louisville	525	111	132	29.52	30.12	+ .07	37.2	− 7.2	66	26	44	14	17	31	34	31	29	77	6.51	+ 2.5	16	8,136	n.	36	sw.	21	2	9	20	7.9	3.2
Evansville	431	72	82	29.62	30.10	+ .06	37.0	.....	61	26	42	16	17	32	27	.....	.....	.....	5.94	.....	17	6,904	ne.	30	s.	26	4	11	16	7.4	4.8
Indianapolis	822	154	164	29.19	30.11	+ .07	31.0	− 8.5	58	26	38	6	17	24	28	29	26	84	6.20	+ 2.6	19	8,493	ne.	36	sw.	21	2	7	22	8.0	30.4
Cincinnati	628	152	160	29.41	30.11	+ .06	34.8	− 7.4	66	26	41	13	17	28	29	32	27	74	6.03	+ 2.7	16	6,948	ne.	31	sw.	4	3	6	22	8.1	11.5
Columbus	824	173	190	29.19	30.10	+ .06	32.0	− 6.1	62	2	39	9	17	25	26	29	25	77	4.59	+ 1.6	17	9,653	ne.	56	sw.	22	3	4	24	8.1	25.3
Pittsburg	842	336	352	29.16	30.09	+ .05	33.8	− 4.9	65	2	41	12	23	27	29	30	26	75	3.85	+ 1.1	18	8,789	ne.	54	w.	21	4	6	21	8.0	20.1
Parkersburg	638	77	84	29.42	30.09	+ .04	36.0	− 5.4	69	30	44	14	18	28	34	32	29	79	4.12	+ 0.5	17	5,606	n.	34	w.	21	6	8	17	6.9	17.6
Elkins	1,940	41	50	27.97	30.09	+ .04	34.8	− 4.1	66	2	43	6	1	26	46	31	29	84	5.38	+ 1.4	22	4,256	w.	30	w.	10	5	6	20	7.3	21.6
Lower Lake Region.							28.2	− 4.1										80	2.72	+ 0.1										7.2	
Buffalo	767	178	206	29.22	30.08	+ .06	27.0	− 3.0	50	27	33	6	23	21	29	24	21	80	3.89	+ 1.3	20	11,657	w.	60	sw.	21	5	11	15	7.0	21.2
Oswego	335	76	91	29.71	30.09	+ .08	26.7	− 3.7	52	27	32	4	24	21	26	25	21	78	3.45	+ 0.8	16	9,170	s.	40	w.	22	6	6	19	7.2	17.1
Rochester	523	81	102	29.51	30.11	+ .09	27.7	− 2.6	53	27	34	7	23	22	27	25	21	78	2.90	0.0	14	6,899	w.	37	sw.	27	4	8	19	7.4	15.2
Syracuse	597	97	113	29.44	30.11	+ .06	26.6	.....	54	27	32	6	24	21	26	.....	.....	.....	4.23	.....	13	9,187	w.	50	s.	26	3	15	13	6.6	21.8
Erie	713	92	102	29.29	30.08	+ .06	28.2	− 4.2	53	3	34	8	23	23	22	26	22	78	2.76	0.0	21	9,244	w.	43	se.	3	5	10	16	6.9	13.5
Cleveland	762	190	201	29.24	30.09	+ .06	28.9	− 4.6	58	3	34	7	23	23	26	26	23	79	2.78	0.0	23	12,604	n.	54	w.	21	1	11	19	7.7	18.5
Sandusky	629	62	70	29.39	30.09	+ .06	29.6	− 5.1	58	3	35	10	23	24	26	.....	.....	.....	1.87	− 0.7	14	7,600	ne.	36	w.	21	3	9	19	7.7	11.6
Toledo	628	120	127	29.40	30.10	+ .07	29.0	− 5.6	54	3	35	10	22	23	26	27	23	80	2.08	0.0	15	8,854	w.	41	w.	21	6	9	16	6.8	10.1
Detroit	730	153	193	29.28	30.11	+ .08	28.2	− 4.3	54	3	34	8	23	22	23	26	23	84	2.03	− 0.3	16	9,807	w.	41	ne.	31	2	9	20	7.6	14.4
Upper Lake Region.							23.6	− 3.4										78	2.20	+ 0.1										6.0	
Alpena	609	13	92	29.43	30.12	+ .09	21.4	− 2.6	43	27	30	− 7	23	13	32	19	16	81	3.15	+ 1.2	10	7,792	nw.	36	e.	2	8	10	13	6.1	19.9
Escanaba	612	40	82	29.45	30.15	+ .11	19.8	− 2.0	41	30	28	− 9	15	11	30	17	13	76	2.84	+ 1.1	10	7,555	n.	38	nw.	21	13	13	5	4.6	16.3
Grand Haven	632	54	92	29.40	30.11	+ .08	27.7	− 2.9	55	26	34	7	23	22	24	25	21	78	1.58	− 0.7	14	9,893	nw.	54	nw.	21	5	10	16	6.7	5.8

TABLE I.—*Climatological data for U. S. Weather Bureau stations, March, 1906*—**Continued.**

Stations.	Elevation of instruments. Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Pressure, in inches. Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Temperature of the air, in degrees Fahrenheit. Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches. Total.	Departure from normal.	Days with .01, or more.	Wind. Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Direction.	Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness during daylight, tenths.	Total snowfall.
Up. Lake Reg—Con't.																															
Grand Rapids	707	127	165	29.31	30.11	+ .08	27.8	− 4.2	53	26	35	6	23	21	23	25	22	81	1.67	− 0.7	14	9,457	ne.	55	w.	21	3	6	22	8.1	6.3
Houghton	668	66	74	29.38	30.15	+ .11	18.2	......	48	7	27	−15	15	10	41	....	....	....	1.69	......	13	5,750	e.	30	w.	21	10	10	11	5.5	18.3
Marquette	734	77	116	29.31	30.15	+ .11	20.7	− 2.5	44	29	27	− 5	15	14	25	18	14	78	3.29	+ 1.4	12	8,449	w.	34	nw.	21	8	12	11	5.8	25.1
Port Huron	638	70	120	29.38	30.10	+ .07	25.8	− 3.3	49	3	31	1	23	20	19	24	21	80	1.87	− 0.8	12	9,666	nw.	44	ne.	31	6	10	15	6.6	16.2
Sault Ste. Marie	614	40	61	29.42	30.15	+ .12	17.6	− 4.3	40	29	26	−14	23	9	31	15	12	84	2.28	+ 1.0	9	6,734	nw.	35	nw.	21	9	9	13	6.0	7.2
Chicago	823	140	310	29.21	30.13	+ .10	30.2	− 3.9	56	26	35	10	22	25	23	28	24	79	1.61	− 0.8	15	12,947	ne.	49	nw.	21	6	8	17	6.8	9.0
Milwaukee	681	122	142	29.38	30.14	+ .11	27.6	− 2.9	50	26	33	3	22	22	29	24	19	72	1.62	− 0.8	13	8,506	w.	34	w.	21	12	8	11	5.2	7.8
Green Bay	617	49	86	29.43	30.13	+ .09	22.2	− 4.5	43	8	29	− 4	15	15	26	19	15	74	3.39	+ 1.2	12	7,865	n.	46	w.	21	9	4	18	6.4	7.6
Duluth	1,133	11	47	28.88	30.16	+ .10	18.6	− 4.4	51	29	26	−12	14	11	34	15	11	77	0.95	− 0.7	8	12,117	w.	56	ne.	2	13	10	8	4.5	8.2
North Dakota.							**19.1**	**− 3.0**										**78**	**0.43**	**− 0.4**										**5.5**	
Moorhead	940	8	57	29.18	30.24	+ .16	19.8	− 0.4	58	29	28	−16	14	11	32	17	15	88	0.80	− 0.1	10	7,560	nw.	34	nw.	21	12	5	14	5.6	5.8
Bismarck	1,674	15	57	28.38	30.26	+ .20	19.2	− 3.4	64	29	29	−22	14	10	38	16	9	66	0.32	− 0.8	5	8,799	nw.	42	nw.	8	13	9	9	5.2	3.2
Devils Lake	1,482	11	44	28.57	30.23	+ .18	17.3	......	58	29	28	−21	14	7	32	14	10	78	0.12	......	2	11,232	w.	42	n.	3	12	3	16	6.0	1.2
Williston	1,875	14	44	28.17	30.25	+ .21	18.4	− 5.1	62	31	29	−34	14	8	36	16	12	78	0.16	− 0.3	6	7,819	ne.	37	nw.	8	11	8	12	5.3	1.6
Upper Miss. Valley.							**28.4**	**− 6.6**										**78**	**2.81**	**+ 0.5**										**7.1**	
Minneapolis	......	102	208	......	......	......	22.4	− 5.0	50	29	30	− 6	11	15	26	....	....	....	0.76	− 0.8	8	9,860	nw.	52	nw.	21	7	9	15	....	4.0
St. Paul	837	171	179	29.22	30.16	+ .11	23.3	− 4.2	52	30	30	− 6	11	16	28	21	15	71	1.07	− 0.4	6	8,887	n.	50	nw.	21	7	12	12	6.7	4.4
La Crosse	714	71	87	29.34	30.15	+ .11	25.6	− 5.2	53	30	32	3	12	19	26	....	....	....	2.69	+ 1.1	9	5,875	n.	38	nw.	21	9	6	16	6.5	3.6
Madison	974	70	78	29.04	30.14	+ .10	24.6	− 5.4	44	30	31	2	12	18	28	22	17	77	2.13	0.0	12	9,091	nw.	53	ne.	30	8	6	17	6.5	4.4
Charles City	1,015	8	58	29.01	30.13	+ .08	24.2	− 7.1	51	30	32	0	16	17	28	21	18	83	3.49	+ 1.6	10	6,702	nw.	39	nw.	21	3	8	20	8.1	8.3
Davenport	606	71	79	29.46	30.14	+ .11	29.2	− 5.7	54	2	35	6	17	23	22	26	22	76	2.20	0.0	15	6,710	nw.	32	nw.	21	4	10	17	7.4	7.9
Des Moines	861	84	101	29.23	30.17	+ .13	28.6	− 6.1	58	2	36	1	17	22	26	26	22	78	1.84	+ 0.4	14	7,211	nw.	31	nw.	21	4	13	14	7.2	11.7
Dubuque	698	100	117	29.39	30.17	+ .13	27.2	− 5.7	53	30	34	5	15	21	24	24	21	79	2.36	+ 0.1	15	7,176	nw.	36	nw.	21	10	5	16	6.3	6.4
Keokuk	614	63	78	29.46	30.17	+ .14	30.1	− 7.5	59	2	36	4	17	24	22	27	23	81	2.82	+ 0.6	13	7,331	n.	35	ne.	30	5	10	16	6.8	10.5
Cairo	356	87	93	29.72	30.11	+ .07	39.2	− 7.6	62	26	45	20	17	33	29	35	32	80	6.07	+ 2.3	15	9,404	n.	41	n.	29	0	9	22	8.5	1.0
La Salle	536	56	64	29.55	30.14	+ .11	29.0	......	54	26	34	8	17	24	22	....	....	....	2.08	......	15	7,541	ne.	34	w.	21	9	7	15	6.5	11.7
Peoria	609	11	45	29.45	30.14	+ .11	29.3	......	56	26	36	5	17	23	25	26	23	78	2.55	......	14	9,044	n.	36	n.	30	8	6	17	6.4	13.2
Springfield, Ill.	644	10	92	29.41	30.12	+ .09	30.6	− 8.6	56	26	37	3	17	24	29	28	24	78	4.02	+ 1.3	19	8,537	ne.	30	nw.	9	4	8	19	7.4	23.4
Hannibal	534	75	109	29.53	30.13	+ .11	31.0	− 8.5	59	26	38	0	17	24	26	....	....	....	2.57	− 0.1	18	9,190	n.	38	se.	26	4	7	20	7.7	21.0
St. Louis	567	208	217	29.49	30.11	+ .08	33.7	− 9.4	63	26	39	13	20	28	23	31	27	78	4.53	+ 1.0	16	9,846	ne.	38	ne.	30	5	5	21	7.8	17.5
Missouri Valley.							**27.9**	**− 7.4**										**78**	**2.34**	**+ 0.6**										**6.8**	
Columbia, Mo	784	11	84	29.28	30.14	+ .11	31.8	− 9.6	62	1	39	7	20	25	29	....	....	....	2.83	− 0.2	15	8,683	n.	40	nw.	8	4	8	19	7.4	18.7
Kansas City	963	78	95	29.10	30.18	+ .16	31.9	− 8.6	64	25	38	8	20	26	32	28	25	79	2.50	+ 0.3	15	6,740	nw.	39	nw.	8	3	10	18	7.2	13.1
Springfield, Mo	1,324	98	104	28.65	30.10	+ .08	34.9	− 8.6	68	26	42	11	20	27	34	32	28	80	5.61	+ 1.9	16	10,073	ne.	42	sw.	2	4	7	20	7.6	4.4
Iola	984	40	47	29.06	30.14	+ .13	34.2	......	69	25	42	9	20	26	34	....	....	....	1.54	......	12	8,386	ne.	35	sw.	2	4	7	20	7.5	2.7
Topeka	......	85	89	......	......	......	32.0	− 9.0	66	25	39	5	20	25	34	....	....	....	2.30	+ 0.2	13	8,199	e.	40	nw.	8	6	11	14	6.6	10.8
Lincoln	1,189	11	84	28.86	30.18	+ .16	28.6	− 7.5	66	1	36	− 5	17	21	32	25	21	78	3.67	+ 2.3	14	8,923	n.	50	nw.	8	4	15	12	6.8	20.4
Omaha	1,105	115	121	28.95	30.18	+ .14	28.6	− 6.9	63	1	35	1	17	22	28	25	20	71	1.75	+ 0.2	13	8,255	n.	47	nw.	8	4	8	19	7.7	14.4
Valentine	2,598	47	54	27.38	30.22	+ .19	22.3	− 8.9	58	31	31	−18	16	13	34	20	16	79	2.50	+ 1.0	11	8,726	nw.	44	n.	2	9	9	13	5.6	23.8
Sioux City	1,135	96	164	28.91	30.18	+ .13	26.2	− 5.4	59	1	33	− 2	16	20	30	....	....	....	0.89	− 0.4	13	10,420	nw.	58	nw.	21	7	5	19	7.1	7.4
Pierre	1,572	43	50	28.51	30.26	+ .21	24.8	− 4.6	64	29	33	−12	14	16	38	21	17	77	0.52	− 0.3	8	6,653	se.	36	nw.	2	11	8	12	5.6	6.2
Huron	1,306	56	67	28.77	30.23	+ .17	20.8	− 6.8	55	29	30	−15	14	12	41	19	16	83	1.41	+ 0.5	9	9,722	nw.	38	nw.	21	12	6	13	5.7	14.3
Yankton	1,233	49	57	28.81	30.18	+ .13	24.6	− 5.4	54	30	32	− 4	16	18	33	....	....	....	1.74	+ 0.6	12	7,497	nw.	48	nw.	8	7	1	23	7.4	10.1
Northern Slope.							**24.3**	**− 7.5**										**75**	**1.54**	**+ 0.7**										**5.2**	
Havre	2,505	11	44	27.45	30.19	+ .19	24.9	− 4.1	74	31	38	−24	15	12	44	21	17	76	0.31	− 0.2	4	6,809	e.	32	sw.	7	15	12	4	4.1	3.1
Miles City	2,371	26	48	27.60	30.26	+ .24	26.9	− 4.5	69	*	39	−14	15	15	39	21	15	66	0.58	0.0	7	4,997	ne.	26	w.	8	13	14	4	4.5	7.0
Helena	4,110	8	56	25.83	30.18	+ .17	25.4	− 7.2	68	30	35	−20	15	16	39	21	16	71	0.70	+ 0.1	8	4,831	sw.	29	w.	6	11	9	11	5.4	9.3
Kalispell	2,962	8	34	26.97	30.12	+ .13	29.8	......	66	30	41	−10	15	19	34	25	19	67	0.72	......	5	3,449	w.	27	ne.	10	14	13	4	4.2	6.8
Rapid City	3,234	46	50	26.66	30.24	+ .23	23.2	− 8.0	66	31	33	−15	15	13	39	21	17	82	1.15	0.0	9	5,570	se.	26	nw.	1	14	4	13	5.3	11.5
Cheyenne	6,088	56	64	23.93	30.13	+ .17	23.7	− 9.1	63	31	34	−17	16	14	37	20	17	81	2.27	+ 1.6	15	7,602	nw.	33	nw.	2	8	9	14	5.9	24.8
Lander	5,372	26	36	24.62	30.18	+ .19	19.8	−10.7	62	31	30	−24	17	9	40	18	15	82	3.56	+ 2.0	11	1,926	sw.	17	ne.	1	7	14	10	5.8	35.2
Yellowstone Park	6,200	11	48	23.80	30.14	+ .12	19.6	......	59	30	30	−24	16	9	38	15	10	70	1.35	......	14	4,559	sw.	36	nw.	12	8	11	12	6.0	18.2
North Platte	2,821	11	51	27.15	30.20	+ .20	26.2	− 8.9	62	30	36	− 8	17	17	37	23	19	80	2.22	+ 1.5	15	7,285	ne.	49	nw.	2	14	4	13	5.5	21.7
Middle Slope.							**33.2**	**− 8.9**										**75**	**1.66**	**+ 0.3**										**6.4**	
Denver	5,291	129	136	24.69	30.11	+ .16	29.8	− 9.0	70	31	40	− 5	19	19	36	25	20	75	1.88	+ 0.9	16	5,886	n.	37	ne.	1	9	8	14	6.6	23.9
Pueblo	4,685	80	86	25.25	30.04	+ .12	32.8	− 7.6	72	31	45	− 1	19	20	47	27	19	63	1.23	+ 0.7	12	5,518	e.	42	ne.	10	9	13	9	5.4	9.0
Concordia	1,398	42	47	28.64	30.17	+ .16	30.0	− 9.0	69	1	38	0	17	23	33	27	24	82	1.79	+ 0.2	13	5,883	n.	31	nw.	8	6	11	14	6.5	13.4
Dodge	2,509	44	54	27.46	30.15	+ .18	31.8	− 9.8	81	25	42	8	12	22	44	27	23	76	1.13	+ 0.2	14	8,600	ne.	52	se.	1	7	6	18	6.8	8.0
Wichita	1,358	78	86	28.68	30.16	+ .17	34.2	− 9.3	68	1	42	11	12	26	35	30	26	78	1.68	− 0.2	12	8,221	ne.	33	nw.	2	7	9	15	6.7	4.7
Oklahoma	1,214	79	86	28.76	30.08	+ .10	40.5	− 8.6	73	8	50	16	17	30	36	35	31	76	2.28	+ 0.2	8	13,683	n.	54	w.	2	9	7	15	6.2	0.4
Southern Slope.							**45.0**	**− 4.5**										**60**	**0.78**	**0.0**										**4.6**	
Abilene	1,738	45	54	28.23	30.06	+ .10	50.2	− 3.9	83	26	63	20	20	38	43	42	34	63	0.91	− 0.3	4	7,565	n.	38	w.	1	10	13	8	5.3	
Amarillo	3,676	10	49	26.24	30.04	+ .09	39.8	− 5.1	74	25	53	12	19	26	54	33	26	67	0.64	+ 0.2	7	9,092	nw.	60	nw.	2	18	7	6	3.5	0.6
Del Rio	944	8	57	29.02	30.01	+ .06	61.0	......	95	27	75	28	20	47	46	....	....	....	0.24	......	3	7,170	se.	30	n.	28	15	9	7	4.6	
Roswell	3,578	9	57	26.29	29.93	+ .03	50.4	......	81	31	68	18	3	33	52	39	26	49	0.24	......	2	6,168	s.	39	nw.	18	8	20	3	5.0	
Southern Plateau.							**51.3**	**+ 0.5**										**51**	**1.66**	**+ 1.0**										**4.3**	
El Paso	3,762	10	110	26.16	29.92	+ .04	57.2	+ 1.4	83	31	71	30	3	44	40	42	26	37	0.01	− 0.4	1	9,637	w.	51	w.	18	13	15	3	3.6	
Santa Fe	7,013	33	39	23.17	29.93	+ .04	40.2	+ 0.7	63	31	51	16	3	30	33	32	22	54	1.05	+ 0.4	15	6,713	sw.	37	nw.	1	13	15	3	4.1	2.9
Flagstaff	6,907	12	44	23.28	29.91	.00	36.8	+ 2.0	61	30	47	1	2	27	41	31	25	68	6.05	+ 4.2	13	7,925	sw.	38	sw.	10	9	4	18	6.3	7.0
Phoenix	1,108	50	56	28.80	29.96	+ .05	60.8	− 0.1	86	30	74	31	2	48	39	49	37	48	0.67	+ 0.1	4	3,533	e.	35	w.	24	11	11	9	4.5	
Yuma	141	16	46	29.82	29.98	+ .04	64.2	+ 0.2	87	9	77	39	2	52	41	52	39	46	0.30	0.0	4	5,395	w.	32	w.	17	19	9	3	2.4	
Independence	3,910	11	42	25.90	29.88	− .06	48.7	− 1.0	72	8	59	24	2	38	35	40	30	53	1.86	+ 1.4	10	6,994	nw.	48	w.	14	12	11	8	4.8	2.5
Middle Plateau.							**39.8**	**− 0.5**										**66**	**2.40**	**+ 1.2**										**5.9**	
Reno	4,532	56	63	25.35	29.92	− .06	40.6	+ 1.1	70	8	52	18	19	30	40	35	28	64	0.70	0.0	13	5,414	sw.	37	sw.	10	10	11	10	5.1	0.5
Winnemucca	4,344	18	56	25.52	29.94	− .07	39.4	− 1.3	68	29	51	2	16	28	39	34	28	70	1.38	+ 0.5	15	6,255	ne.	54	se.	12	14	7	10	4.9	4.8
Modena	5,479	10	43	24.52	29.92	− .04	36.8	0.0	63	10	48	1	19	26	41	32	26	68	3.22	+ 2.3	11	9,614	sw.	60	sw.	12	7	9	15	6.3	13.3
Salt Lake City	4,366	105	110	25.55	29.96	− .02	39.8	− 1.8	65	30	48	15	16	31	29	34	28	65	2.84	+ 0.8	15	4,677	se.	60	nw.	13	8	4	19	6.6	20.7
Durango	6,546	18	56	23.56	29.92	.00	37.2	......	64	31	48	9	19	27	36	31	25	66	4.83	+ 3.3	16	4,048	nw.	28	nw.	1	9	8	14	6.0	13.0
Grand Junction	4,608	43	51	25.31	29.91	− .03	42.2	− 0.6	71	31	53	14	19	32	37	36	29	64	1.45	+ 0.6	13	3,823	nw.	30	sw.	13	7	9	15	6.4	5.1
Northern Plateau.							**36.2**	**− 4.2**										**72**	**2.04**	**+ 0.4**										**5.8**	
Baker City	3,471	52	58	26.40	30.05	+ .02	30.3	− 5.2	58	29	39	− 8	16	21	28	27	23	76	2.34	+ 0.5	15	4,960	s.	25	n.	31	11	9	11	5.7	23.8
Boise	2,739	78	86	27.14	30.06	+ .03	37.4	− 6.5	63	29	47	5	13	28	31	33	28	72	2.17	+ 0.4	16	4,654	se.	32	se.	30	7	11	13	6.8	9.1
Lewiston	757	10	51	29.23	30.06	+ .03	40.8	− 3.0	71	29	50	7	16	31	33	....	....	....	1.17	+ 0.4	10	5,209	e.	48	ne.	11	13	8	10	5.3	4.2
Pocatello	4,477	46	54	25.44	30.06	+ .05	30.0	− 4.3	58	30	39	−12	17	21	37	27	23	76	3.57	+ 1.4	17	5,250	se.	40	se.	12	8	14	9	5.3	26.5
Spokane	1,929	101	110	27.98	30.08	+ .07	36.7	− 3.0	65	29	46	8	15	27	30	32	23	60	0.97	− 0.4	9	5,025	ne.	32	nw.	10	4	8	19	7.2	0.2
Walla Walla	1,000	71	79	28.94	30.03	+ .01	42.2	− 3.3	73	29	52	10	15	33	34	39	35	75	1.99	+ 0.2	10	4,563	s.	31	se.	3	14	16	1	4.3	4.4
N. Pac. Coast Reg.							**44.6**	**− 0.5**										**74**	**2.10**	**− 3.1**										**6.7**	
North Head	211	11	56	29.73	29.96	− .05	45.0	− 0.4	69	8	50	24	13	40	20	43	41	88	2.91	− 3.5	15	11,032	e.	58	se.	23	7	8	16	6.7	1.5
Port Crescent	259	12	29	29.69	29.98	.00	41.0	− 0.6	62	8	48	17	15	34	28	....	....	....	0.67	− 4.0	9	6,961	ne.	60	ne.	11	5	13	13	6.6	T.
Seattle	123	185	224	29.88	30.01	+ .02	45.5	+ 0.7	65	6	53	24	13	38	22	40	33	65	0.89	− 2.2	8	5,495	e.	30	sw.	21	7	12	12	6.1	
Tacoma	213	113	120	29.77	30.00	.00	44.2	− 0.2	66	6	52	20	14	36	26	....	....	....	1.26	− 2.7	11	5,116	n.	43	e.	11	5	7	19	7.1	
Tatoosh Island	86	7	57	29.85	29.95	− .01	44.7	+ 0.4	58	21	49	29	12	40	13	41	36	74	4.22	− 4.9	17	14,253	e.	66	ne.	11	6	7	18	6.8	
Portland, Oreg.	153	68	96	29.81	29.97	− .05	45.4	− 1.8	70	28	53	22	12	38	30	41	34	67	2.23	− 3.3	12	5,455	nw.	34	ne.	11	5	8	18	7.0	4.0
Roseburg	510	9	57	29.37	29.93	− .11	46.2	− 1.5	69	9	56	20	16	36	30	42	38	76	2.55	− 1.0	19	2,400	nw.	17	sw.	26	8	6	17	6.4	8.7

TABLE I.—*Climatological data for U. S. Weather Bureau stations, March, 1906*—Continued.

Stations.	Elevation of instruments. Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Pressure, in inches. Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Temperature of the air, in degrees Fahrenheit. Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches. Total.	Departure from normal.	Days with .01, or more.	Wind. Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Direction.	Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness during daylight, tenths.	Total snowfall.
Mid. Pac. Coast Reg.							51.7	− 0.6										78	8.05	+ 4.0										6.6	
Eureka	62	62	80	29.88	29.96	− .10	48.8	+ 0.1	71	29	55	33	16	43	22	46	43	82	7.72	+ 1.5	19	6,058	se.	40	nw.	31	6	6	19	6.6	1.8
Mount Tamalpais	2,375	11	18	27.49	29.98	− .08	45.6	....	70	7	51	30	12	41	19	42	39	82	8.07	....	18	13,749	se.	71	sw.	12	4	10	17	7.1	0.3
Point Reyes Light	490	7	18	29.42	29.93	.....	51.6	+ 1.5	74	7	56	38	13	47	20				6.21	+ 1.7	16	16,446	s.	74	nw.	31	6	10	15	6.7	
Red Bluff	332	50	56	29.59	29.95	− .09	51.4	− 3.1	80	8	59	32	15	44	34	47	43	76	12.84	+ 9.6	16	5,247	se.	28	se.	13	8	4	19	7.1	
Sacramento	69	106	117	29.91	29.98	− .05	52.8	− 1.9	74	9	59	38	1	46	21	48	44	74	8.45	+ 5.5	17	7,119	se.	39	se.	3	7	11	13	5.9	
San Francisco	155	161	167	29.84	30.02	− .04	54.0	+ 0.4	74	8	60	41	12	48	23	49	45	74	5.02	+ 1.9	17	6,348	se.	38	se.	3	7	7	17	6.9	
San Jose	141	78	88	29.84	30.00	.....	53.9	....	77	8	63	35	1	45	31				4.44	....	18	4,924	se.	34	se.	3	7	9	15	5.9	
Southeast Farallon	30	9	17	29.94	29.98	.....	53.1	....	70	7	56	43	13	50	14				4.63	....	15	11,623	nw.	56	s.	3	8	6	17	6.6	
S. Pac. Coast Reg.							56.0	+ 0.5										75	6.75	+ 4.5										5.8	
Fresno	330	67	70	29.66	30.02	+ .01	54.0	− 0.5	76	9	63	34	1	45	31	49	45	73	4.12	+ 2.8	15	4,120	se.	36	s.	12	7	10	14	6.4	
Los Angeles	338	116	123	29.66	30.03	+ .01	57.8	+ 1.5	86	8	66	40	18	49	36	52	47	72	7.35	+ 4.4	15	4,776	sw.	28	sw.	17	7	8	16	6.4	
San Diego	87	94	102	29.93	30.02	.00	57.8	+ 1.8	80	8	64	41	2	52	25	53	48	75	4.68	+ 3.1	11	5,362	nw.	35	se.	11	15	6	10	4.6	
San Luis Obispo	201	47	54	29.81	30.03	− .03	54.6	− 0.6	82	8	63	35	19	46	36	50	46	79	10.86	+ 7.8	18	4,207	s.	24	s.	12	8	9	14	5.8	
West Indies.																															
Grand Turk	11	6	20	30.03	30.04	+ .02	76.8	....	87	17	83	64	14	71	19				4.30	....	14	....	e.								
San Juan	82	48	90	29.94	30.03	+ .01	75.7	− .03	86	15	82	66	26	70	15	70	67	77	2.91	+ 0.6	12	8,059	e.	29	e.	3	12	15	4	4.1	

* More than one date.

TABLE II.—*Climatological record of cooperative observers, March, 1906.*

Stations.	Temperature (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Alabama.	°	°	°	*Ins.*	*Ins.*
Alaga				5.68	
Ashville	71	24	48.8	10.99	
Benton				9.69	
Bermuda	81	24	54.6	7.69	
Boligee	76	26	52.9	9.53	
Bridgeport				5.29	
Burkeville				9.85	
Calera				13.42	
Camp Hill	75	24	51.0	8.90	
Cedar Bluff				12.41	
Citronelle	78	29	57.0	9.74	
Clanton	75	24	50.8	15.07	
Cordova	75	21	49.8	9.44	T.
Dadeville				9.74	
Daphne ᵉ	75	32	56.8		
Decatur	78	25	50.2	6.82	
Demopolis				15.78	
Eufaula	76	28	52.8	4.21	
Evergreen	80ᵇ	26ᵇ	53.2ᵇ	6.60	
Flomaton	82	26	58.4	7.25	
Florence	71	24	48.0	5.32	
Fort Deposit	77	28	53.0	7.39	
Gadsden	74	24	51.3	12.76	
Goodwater	75	23	51.4	12.16	T.
Greensboro	73	28	52.7	13.84	
Greenville				4.95	
Guntersville				9.57	
Hamilton	77	28	50.0	13.38	T.
Highland Home	79	29	55.1	6.72	
Letohatchie				7.50	
Livingston	76	28ᵍ	50.8ᵍ	12.39	
Lock No. 4	72	24	50.4	11.13	T.
Lucy	85	25	59.0	3.80	
Madison Station	76	24	48.6	7.03	
Maplegrove	73	26	48.2	11.95	
Marion	79	25	51.8	12.96	
Milstead				8.34	
Newbern	76	26	51.9	14.34	
Notasulga				6.95	
Oneonta	71	21	48.8	11.86	T.
Opelika	77	23	52.1	7.38	T.
Ozark				3.92	
Prattville	78	25	53.0	8.96	
Riverton	74	21	47.1	6.05	
Scottsboro	79ᵉ	21ᵉ	48.0ᵉ	8.41	T.
Selma	80	27	52.9	11.26	
Springhill	73	31	56.4		
Talladega	73	22	51.1	7.45	T.
Tallassee				10.06	
Thomasville				6.28	
Tuscaloosa	75	25	49.8	9.07	
Tuscumbia	71	27	47.6	4.98	
Tuskegee	77	26	54.4	6.92	
Union Springs	78	26	53.6	10.13	
Uniontown	78	28	53.6	11.83	
Valleyhead	73	20	46.6	10.00	
Vienna				6.94	
Wetumpka	78	27	53.9	10.65	
Alaska.					
Chestochena		−3		0.30	3.0
Copper Center	39	−15	16.5	0.69	9.2
Fairbanks	46	−22	17.7	0.33	3.3
Fort Liscum	44	18	31.2	7.54	103.2
Juneau	59	22	41.9	0.56	T.
Ketchemstock	40	−27	7.8	0.06	1.0
Killisnoo	49	21	37.0	0.90	
Loring	59	16	38.2	8.56	
North Fork		−23			1.0
Orca		22		5.34	39.0
Sitka	55	21	39.0	1.58	6.0
Skagway	52	22	36.4	0.57	T.
Sunrise	52	8	27.0	3.63	33.9
Tanana	42	−24	13.0	T.	
Teikhill	45	−11	20.4	1.87	26.2
Arizona.					
Allaire Ranch				0.42	
Arizona Canal Co. Dam	90	29	61.4	0.86	
Aztec	91	37	60.9	0.24	
Benson	88	23	55.7	0.07	
Bisbee	72	25	52.2	1.11	T.
Blue	81	20	47.3	1.92	
Bonita				0.22	
Bowie	82	38	54.2	0.21	
Buckeye	87	24	58.8	0.60	
Casagrande	85	33	60.8	0.37	
Clifton				1.88	T.
Cline	84	27	56.5	3.20	
Cochise *¹	76	29	52.6	0.40	
Congress	76	33	55.8	3.82	
Douglas	81	25	54.8	0.90	
Dudleyville	86	26	58.0	0.98	T.
Duncan	78	20	51.4	0.35	T.
Fort Apache	76	11	47.4	3.07	
Fort Huachuca	79	25	52.6	1.10	
Fort Mohave	86	31	61.4	1.00	
Gilabend	90	29	61.6	0.03	
Globe	77	24	53.4	2.76	
Greaterville	75	21	51.0	0.85	
Greer				2.44	12.0
Holbrook	71	20	46.0	0.46	1.0
Huachuca Res				4.33	
Jerome	69	27	50.0	4.10	T.
Keams Canyon	62	10	41.5	3.21	2.0
Kingman	76	25	51.1	3.49	
Maricopa	87	25	60.6	0.30	
Mesa	90	26	61.2	0.63	
Mohawk Summit *¹	85	55	67.6	0.12	
Natural Bridge				4.75	T.
Nutrioso				2.21	2.0
Oracle	75	31	52.6	2.25	1.0
Paradise	72	24	50.8	1.64	0.5
Phoenix	85	24	59.2	0.74	
Picacho *¹	90	42	63.2		
Pinal Ranch				5.23	
Pinto				1.71	3.0
Prescott	70	16	43.8	5.71	2.0
Roosevelt	92	32	62.8	2.60	
Arizona—Cont'd.	°	°	°	*Ins.*	*Ins.*
St. Michaels	61	8	38.6	1.41	7.6
San Carlos	83	25	56.4	2.33	T.
San Simon	80	27	53.0	0.37	
Seligman	71	12	44.3	2.84	T.
Sentinel *¹	90	40	63.1	0.04	
Show Low				6.36	3.0
Signal	83	28	57.0	2.79	
Silver Bell	83	37	61.9	0.40	
Tempe	91	22	59.8	0.44	
Thatcher	85	18	55.4	0.40	
Tombstone	76	25	54.0	0.24	
Tuba	69	17	46.2	1.59	3.6
Tucson	87	24	58.4	0.33	
Walnut Grove				5.50	
Willcox	80	20	51.2	0.59	
Yarnell				4.25	0.5
Young	75	11	47.8	3.51	
Arkansas.					
Alicia	70	17	40.9	8.05	
Amity	76	24	47.0	4.84	T.
Arkadelphia	76	25	48.8	5.14	2.0
Arkansas City				4.98	
Arnett	70	13	40.0	6.54	0.5
Batesville	68	20	43.6	5.88	T.
Blackrock				6.81	1.0
Brinkley	79	25	45.9	5.74	
Calico Rock				7.31	
Camden	78	26	50.8	4.11	
Center Point	88	24	50.8	4.66	
Clarendon				4.55	1.0
Conway	74	22	46.0	5.62	T.
Cornerstone				7.35	
Corning	69	20	41.7	9.27	0.5
Dardanelle				4.72	
Des Arc	74	24	46.0	5.36	T.
Dodd City	72	14	39.9	6.46	3.5
Dutton	70	15	41.5	6.83	0.5
Eldorado	80	26ᵈ	49.4ᵉ	4.25	
Eureka Springs	72	15	40.6	6.26	T.
Fayetteville	71	16	41.3	9.03	T.
Forrest City	74	23	44.9	3.70	
Fulton				3.56	
Hardy	68	17	40.0	8.66	6.9
Harrison	78	10	37.2	7.11	1.1
Heber	71	21	44.9	6.96	T.
Helena	72	27	47.6	4.35	
Hope	78	24	50.4	4.24	
Huntsville	72	14	42.2	8.89	2.5
Jonesboro	74	19	43.8	6.36	
Junction	80	24	50.6	4.18	
Lacrosse	67	18	39.8	5.73	T.
Lake Village	79	28	49.6	6.74	
Lewisville	80ᵉ	25ᵉ	51.0ᵉ	4.63	
Lutherville	72	17	42.6	6.61	T.
Luxora				7.95	
Malvern	74	25	45.5	5.40	T
Marked Tree				4.10	
Marvell	76	26	48.4	4.07	T.

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
***Arkansas*—Cont'd.**					
Mena	75	20	44.5	4.78	
Mountain Home	69	17	40.7	7.45	7.0
Newport	75	20	44.3	5.40	T.
Oregon	.....	.....	.....	7.11	1.1
Ozark	77	19	44.0	5.69	T.
Pinebluff	78	26	47.2	6.04	
Pocahontas	.....	.....	.....	6.85	0.2
Pond	83	.....	.....	5.71	T.
Prescott	78	25	48.4	4.37	1.0
Princeton	76	22	48.9	5.10	T.
Rison	80^{e}	25^{e}	50.9^{e}	5.24	T.
Rogers	73	14	40.6	5.92	T.
Russellville	72	22	43.4	3.99	
Spielerville	75	22	44.7	5.45	T.
Stuttgart	75	25	47.7	5.31	T.
Texarkana	75	25	46.3	.....	
Warren	81	25	49.0	4.74	
White Cliffs	.....	.....	.....	4.64	
Wiggs	75	22	46.7	5.96	T.
Winchester	78	28	53.9	.....	
Witts Springs	67	13	35.6	.....	
California.*					
Colorado.					
Akron	.....	.....	.....	1.51	29.0
Alford	65	−20	25.0	2.30	28.0
Antelope Springs	52	−34	24.4	5.26	49.5
Ashcroft	53	−12	24.0	5.84	74.0
Blaine	70	−2	33.4	1.37	14.0
Boulder	67	−4	29.8	2.45	24.0
Breckenridge	50	−13	24.8	2.41	35.0
Burlington	64	−6	26.7	1.35	11.0
Cardinal	52	−13	23.2	3.95	48.0
Castlerock	72^{d}	−20	27.2^{b}	2.03	17.0
Cheesman	63	−20	29.8	1.92	17.2
Cheyenne Wells	65	−9	28.2	0.82	12.0
Clearview	52	−4	28.2	1.84	27.0
Collbran	68	−10	36.4	2.91	17.5
Colorado Springs	62	−5	27.6	3.03	24.7
Cripplecreek	.....	.....	.....	1.78	28.7
Delta	71	11	41.6	0.95	2.8
Dunkley	52	−17	25.3	3.82	52.5
Eagle	63	−14	34.0	2.09	25.5
Fort Collins	70	−25	25.1	2.44	26.4
Fort Morgan	73	−12	27.4	.....	.....
Fowler	.....	.....	.....	1.06	7.5
Frances	63	−7	27.6	3.88	45.3
Fruita	71	15	42.2	3.09	4.0
Garnett	64	−10	33.8	0.49	0.5
Glenwood Springs	58	−8	33.9	2.74	21.0
Greeley	72	−16	27.3	3.06	37.0
Gunnison	50	−25	22.8	2.12	22.2
Hahns Peak	42	−20	22.9	2.67	45.0
Hamps	63	−13	26.7	2.25	25.0
Hoehne	74	−12	33.0	1.19	9.0
Holly	89	3	34.4	1.07	4.5
Lake City	55	−16	28.6	2.43	35.5
Lamar	78	5	36.8	1.90	14.0
Laporte	.....	.....	.....	3.01	35.8
Las Animas	80	−1	36.3	0.92	3.0
Lay	63	−26	28.7	1.48	22.5
Leroy	66	−8	23.2	1.38	18.3
Longs Peak	52	−23	21.3	3.32	45.0
Mancos	63	1	35.4	5.31	30.0
Manassa	68	5	38.4	0.20	3.0
Meeker	63	−22	31.8	2.86	28.0
Montrose	72	−5	39.4	1.86	15.0
Moraine	55	−21	25.1	4.57	62.0
Paonia	68	7	39.4	4.69	18.0
Platte Canon	.....	.....	.....	2.25	20.0
Rockyford	74	1	34.8	0.92	5.5
Saguache	65	2	35.4	0.67	8.0
Salida	66	−8	38.0	2.31	16.5
San Louis	58	7	37.4	0.29	1.5
Santa Clara	66	−12	31.6	2.35	26.0
Sapinero	51	−12	28.3	5.54	64.4
Sheridan Lake	78	2	30.8	0.90	8.4
Silt	67	−3	36.2	1.74	18.0
Silverton	50	−22	25.9	10.04	85.0
Stonewall	.....	.....	.....	1.36	19.0
Sugar City	.....	.....	.....	1.45	8.0
Trinidad	71	−4	36.5	0.97	8.0
Victor	67	−2	38.3	1.75	17.4
Vilas	.....	.....	.....	0.82	2.5
Wagon Wheel	56	−23	26.8	3.98	43.0
Waterdale	70	−15	25.4	2.78	26.5
Whitepine	47	−19	21.8	4.54	58.0
Wray	69	−7	28.6	1.88	20.0
Yuma	.....	.....	.....	2.36	20.0
Connecticut.					
Bridgeport	52	10	33.3	5.53	13.6
Canton	51	−6	28.4	4.95	21.0
Colchester	55	4	30.5	5.08	12.0
Falls Village	.....	.....	.....	3.97	19.7
Hawleyville	54	2	30.8	4.17	15.5
Lake Konomoc	.....	.....	.....	4.83	.....
New London	52	11	33.0	4.13	10.5
North Grosvenor Dale	57	−3	30.3	4.68	.....
Norwalk	53	3	31.6	5.79	10.8

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
***Connecticut*—Cont'd.**					
Southington	52	−1	30.0	5.40	14.0
South Manchester	.....	.....	.....	4.67	14.0
Storrs	52	2	28.9	5.46	.....
Voluntown	57	2	31.1	4.67	6.0
Wallingford	.....	.....	.....	6.40	15.0
Waterbury	57	1	31.2	5.97	17.0
West Cornwall	52	3	26.0	4.06	28.9
West Simsbury	.....	.....	.....	4.62	20.0
Delaware.					
Delaware City	.....	.....	.....	5.89	3.1
Milford	61	14	39.8	6.22	4.0
Millsboro	63	19	40.0	6.21	2.0
Newark	61	15	35.8	6.33	8.5
Seaford	61	15	38.4	5.88	4.0
District of Columbia.					
West Washington	64	16	38.0	5.16	7.7
Florida.					
Apalachicola	77	36	59.4	3.92	
Archer	88	27	63.1	2.69	
Avon Park	87	42	65.5^{m}	1.96	
Bartow	88	37	65.3	1.80	
Bonifay	80	29	58.8	4.45	
Brooksville	88	34	63.1	3.34	
Carrabelle	79	33	59.8	4.86	
Caxambus	87	44	68.7	3.40	
Clermont	88	39	66.8	2.62	
De Funiak	81	27	57.6	6.25	
Deland	85	30	62.4	.....	
Eustis	86	32	63.7	3.39	
Federal Point	84	30	62.0	2.23	
Fernandino	82	35	59.8	1.37	
Flamingo	84	50	71.1	2.30	
Fort Meade	88	36	64.2	6.58	
Fort Myers	83	43	65.8	2.84	
Fort Pierce	84	42	66.0	2.55	
Gainesville	86	30	61.8	1.57	
Galt	80	30	58.2	8.10	
Grasmere	84	36	63.6	.....	
Huntington	86	31	62.1	2.14	
Hypoluxo	83	45	68.8	3.70	
Inverness	85	33	62.4	3.56	
Jasper	82	31	60.8	2.66	
Johnstown	85^{d}	30^{d}	61.0^{d}	2.81	
Kissimmee	82	37	63.2	2.74	
Lake City	85	31	61.2	2.78	
Macclenny	84	27	60.2	2.36	
Madison	82	30	59.4	2.18	
Malabar	84	38	64.8	2.52	
Manatee	83	41	64.8	3.41	
Merritt Island	81	42	66.1	2.20	
Miami	84	52	70.8	4.38	
Middleburg	.....	.....	.....	2.08	
Molino	79	24	56.8	8.29	
Monticello	80	32	59.9	2.65	
New Smyrna	87	32	64.8	3.25	
Nocatee	86	41	66.1	3.03	
Ocala	88	31	63.5	3.20	
Orange City	92	29	64.2	2.18	
Orange Home	86	33	63.8	2.48	
Orlando	85	34	63.7	2.80	
Rockwell	85^{e}	32^{e}	64.1^{e}	4.19	
St. Andrews	77	30	58.1	4.44	
St. Augustine	83	33	61.2	2.13	
St. Leo	84	34	64.2	2.14	
Stephenville	.....	.....	.....	3.24	
Sumner	82	26	60.8	3.39	
Switzerland	85	29	61.2	1.18	
Tallahassee	77	32	58.2	4.65	
Tarpon Springs	84	35	62.6	2.71	
Titusville	84	35	63.8	1.36	
Wausau	81	28	59.8	5.23	
Georgia.					
Abbeville	.....	.....	.....	4.49	
Adairsville	72^{b}	23^{d}	47.5^{e}	9.81	
Albany	82	30	57.2	5.25	
Allapaha	82	27	56.3	3.33	
Americus	78	28	54.0	5.16	
Athens	73	23	47.2	9.14	
Bainbridge	86	26	58.8	3.96	
Blakely	80	27	57.3	4.07	
Bowersville	73	24	47.2	8.67	
Brunswick	84	33	56.0	0.93	
Butler	.....	.....	.....	4.95	
Camak	72	25	47.8	4.46	
Canton	.....	.....	.....	10.97	
Carlton	.....	.....	.....	8.44	
Carrollton	71	23	46.6	9.91	T.
Clayton	71	15	45.5	10.36	
Columbus	77^{f}	29^{f}	53.6^{f}	6.43	
Cordele	82	25	55.1	2.45	
Covington	.....	.....	.....	8.33	
Cuthbert	76	28	54.8	3.92	
Dahlonega	72	19	46.0	10.37	T.
Dawson	82	27	57.6	3.68	
Diamond	68^{i}	16^{i}	47.7^{i}	.....	
Dublin	.....	.....	.....	3.26	
Eastman	80	29	58.4	4.49	
Eatonton	78	24	51.8	7.08	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
***Georgia*—Cont'd.**					
Elberton	73	25	49.0	8.17	
Experiment	73	26	50.2	6.99	T.
Fitzgerald	80	28	56.8	5.03	
Fleming	85	25	58.6	2.83	
Forsyth	78	27	52.8	6.36	
Fort Gaines	77	30	55.0	3.90	
Gainesville	71	23	46.5	8.77	T.
Gillsville	73	24	48.4	10.62	
Glenville	80	28	56.2	3.22	
Greenbush	70	20	47.0	9.97	T.
Greensboro	80	25	50.0	6.40	
Griffin	72	22	51.0	7.43	
Harrison	80	20	53.3	3.05	
Lost Mountain	72	25	47.6	9.99	T.
Louisville	[illegible]	27	54.2	3.26	
Lumpkin	.....	.....	.....	4.55	
Marshallville	78	[illegible]	54.4	6.16	
Mauzy	81	[illegible]	58.6	5.23	
Milledgeville	79	26	53.0	4.91	
Millen	82	27	54.0	2.19	
Montezuma	.....	.....	.....	4.80	
Monticello	77	25	51.0	7.43	
Morgan	74	29	55.4	4.38	
Newnan	72	22^{d}	48.9	13.77	
Oakdale	.....	.....	.....	9.84	
Oxford	76	24^{e}	49.4^{e}	7.87	T.
Point Peter	78	24	48.8	8.88	
Poulan	81	25	58.6	4.08	
Putnam	78	26	54.3	5.52	
Quitman	81	28	58.0	3.58	
Ramsey	72	20	18.0	8.47	T.
Resaca	.....	.....	.....	9.81	
Rome	70	21	48.2	11.26	T.
St. George	86	28	59.9	1.60	
St. Marys	85	27	59.4	1.02	
Screven	83^{e}	31^{e}	59.2^{e}	2.00	
Statesboro	80	32	54.9	4.50	
Talbotton	76	24	53.0	6.06	
Tallapoosa	72	28	49.6	8.11	0.1
Toccoa	73	21	46.4	10.54	
Valdosta	81	29	58.4	2.29	
Valona	82	28	57.3	0.92	
Washington	76	24	49.2	4.49	
Waycross	84	30	58.4	1.44	
Waynesboro	81	27	54.2	7.13	
Westpoint	76	26	51.6	7.37	
Woodbury	75	23	49.8	5.00	
Idaho.					
American Falls	59	−16	29.2	2.95	.....
Blackfoot	59	−24	26.9	4.45	23.0
Caldwell	67	−6	36.8	1.69	10.5
Cambridge	63	−7	31.6	3.07	17.8
Chesterfield	49	−31	23.1	3.72	28.0
Dent	68	3	38.6	1.14	9.0
Dewey	56	−7	29.0	1.90	17.5
Ellerslie	61	6	36.6	1.44	2.0
Fernwood	.....	.....	.....	0.79	3.0
Forney	67	−23	26.6	2.24	22.4
Garnett	68	11	42.6	1.35	.....
Glens Ferry	66	9	39.4	.....	
Grangeville	61	−4	33.0	3.31	19.5
Hailey	.....	−13	.....	2.49	20.9
Hope	.....	.....	.....	0.95	4.0
Hot Springs	69	1	40.6	1.22	11.0
Idaho Falls	58	−26	27.2	2.87	26.0
Kellogg	65	−1	34.9	1.46	0.5
Lake	48	−26	18.2	2.80	28.0
Lakeview	60	1	33.8	0.50	2.0
Landore	52	−18	26.8	3.56	22.7
Lardo	52	−15	27.6	1.94	12.7
Lost River	46	−19	21.2	2.08	35.3
Lovell	.....	.....	.....	2.31	
Meadows	59	−16	29.2	1.52	12.0
Milner	60	−3	32.8	2.72	17.0
Minidoka	59	−11	31.2	2.13	8.9
Moscow	63	−2	36.4	2.00	3.5
Mountain Home	65	6	37.9	0.88	2.5
Murray	65	−7	31.8	1.09	6.0
Oakley	65	−2	34.0	1.85	8.0
Ola	64	0	36.1	2.52	9.6
Paris	45	−23	21.7	2.79	22.6
Payette	66	−5	36.7	3.80	7.7
Pollock	70	3	39.4		
Poplars	.....	.....	.....	2.23	
Porthill	64	−5	33.1	0.20	2.0
Riddle	54	−23	27.4	2.62	27.0
Roosevelt	52	−15	24.9	3.00	23.5
St. Maries	68	0	36.4	1.24	1.0
Salem	.....	.....	.....	2.43	14.3
Salmon	62	−18	27.4	0.84	17.0
Soldier	54	−35	18.4	2.37	22.5
Standrod	.....	.....	.....	3.06	11.9
Twin Falls	63	−3	34.7	1.99	7.5
Westlake	.....	.....	.....	4.11	24.0
Weston	61	3	33.3	3.71	9.5
Illinois.					
Albion	60	9	35.1	5.35	.....
Aledo	55	0	28.9	2.42	15.0

*Reports from California destroyed at San Francisco. Copies will be obtained later.

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Illinois—Cont'd.	°	°	°	*Ins.*	*Ins.*
Alexander	56	— 6	30.2	2.93	22.5
Antioch	50	4	27.2	0.60	2.0
Ashton	52	1	27.7	3.32	8.3
Astoria	55	— 1	29.3	3.90	23.0
Aurora	53	4	28.6	2.12	6.4
Beardstown	....	....	....	2.78	....
Bloomington	57	2	31.0	2.39	16.3
Bushnell	58	0	30.2	4.66	14.5
Cambridge	54	3	29.0	3.65	12.8
Carlinville	59	0	32.1	4.20	19.5
Carlyle	....	....	....	4.72	....
Carrollton	60	2	32.8	5.40	18.0
Charleston	56	0	31.5	4.80	18.5
Chester	64	16	37.8	5.84	6.8
Cisne	60	9	36.0	3.39	....
Coatsburg	58	— 2	29.6	2.40	11.5
Cobden	61	15	37.5	6.70	3.0
Colchester	58	— 1	29.8	2.83	14.0
Decatur	55	— 1	30.4	4.93	30.5
Dixon	51	1	27.8	2.70	....
Dwight	57	2	29.8	2.15	11.6
Equality	62	16	38.2	6.88	5.5
Flora	60	8	35.3[f]	3.87	13.5
Friendgrove	58	10	35.1	5.09	....
Galva	54	— 1	27.0	2.24	19.7
Grafton	....	....	....	4.08	....
Greenville	59	7	32.8	5.35	13.5
Griggsville	58	0	31.0	3.05	....
Halfway	59	14	36.7	6.23	4.0
Havana	57	5	32.4	2.94	13.5
Henry	54	4	30.6	2.31	13.0
Hillsboro	59	3	32.8	4.47	22.7
Hoopeston	56	1	30.6	4.46	24.5
Joliet	56	8	31.0	1.61	10.4
Kishwaukee	50	3	27.6	2.88	3.5
Knoxville	54	— 1	28.8	3.51	16.5
Lagrange	55	6	29.0	2.56	9.2
Laharpe	55	— 3	29.0	4.19	11.0
Lanark	50	0	27.3	2.44	1.7
Lincoln	55	2	31.2	2.90	....
Loami	....	....	....	3.41	22.0
McLeansboro	60	14	36.4	5.38	3.5
Martinsville	58	0	32.4	3.55	10.0
Martinton	58	4	28.8	3.54	14.0
Mascoutah	60	12	33.8	6.22	11.0
Mattoon	59	5	35.8	5.64	23.4
Minonk	57	3	29.8	1.95	14.0
Monmouth	56	2	29.6	3.77	17.2
Morrison	51	2	28.7	3.36	9.7
Morrisonville	57	— 1	30.6	3.65	15.5
Mount Carmel	....	....	....	6.50	....
Mount Vernon	61[c]	16	35.5[b]	5.58	1.2
New Burnside	66	13	37.2	6.68	4.5
Olney	61	8	35.1	4.84	8.1
Ottawa	55	8	30.6	2.02	4.0
Palestine	60	6	34.6	5.07	7.0
Pana	55	0	31.0	4.75	15.5
Paris	58	4	30.9	5.30	14.0
Plumhill	61	11	35.2	4.14	6.0
Pontiac	59	3	30.4	3.28	15.0
Rantoul	53	1	29.8	4.09	22.0
Raum	61	13	37.1	7.68	1.0
Riley	49	4	27.3	1.94	4.7
Robinson	59	6	33.7	4.29	12.7
Rockford	50	8	28.6	3.35	6.5
Rushville	58	0	31.2	3.49	17.5
St. Charles	51	4	29.4	3.21	16.5
St. John	61	14	36.4	4.38	....
Shobonier	62[e]	8[e]	32.8[e]	5.36	10.8
Streator	53	5	29.0	2.77	....
Sullivan	56	— 1	30.2	5.12	19.8
Sycamore	51	6	27.4	3.06	4.5
Tilden	65	11	35.7	4.36	5.0
Tiskilwa	52	— 1	28.2	3.71	11.2
Tuscola	57	— 3	29.0	5.43	28.0
Urbana	53	— 5	29.0	4.61	32.0
Walnut	53	3	29.6	5.22	7.7
Warsaw	....	....	....	2.97	8.3
Windsor	56	— 2	31.0	4.90	21.6
Winnebago	50	3	27.2	3.24	6.0
Yorkville	53	7	28.8	1.31	4.1
Zion	48	1	26.4	3.10	3.0
Indiana.					
Anderson	56	2	30.3	4.36	25.8
Angola	55	7	29.2	2.53	11.4
Auburn	57	2	26.9	2.36	....
Bedford	63	10	34.9	....	....
Bloomington	56	9	34.6	9.31	26.0
Bluffton	57	1	28.6	3.68	20.0
Butlerville	61	6	33.8	6.45	7.0
Cambridge City	56	— 5	27.7	5.25	22.0
Columbus	64	5	33.6	5.82	14.0
Connersville	64	1	32.4	7.25	24.0
Crawfordsville	56	2	29.3	4.48	....
Delphi	57	1	28.8	3.79	22.2
Elkhart	58	10	29.8	2.61	11.7
Farmersburg	60[d]	2[d]	32.0[d]	4.82	22.0
Farmland	55	0	30.5	4.12	27.5

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Indiana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Fort Wayne	58	7	30.4	2.84	18.5
Franklin	59	2	32.6	6.52	31.0
Greencastle	58	1	31.5	6.16	26.5
Greenfield	56	4	31.5	6.85	31.5
Greensburg	63	4	33.0	5.63	14.5
Hammond	50	12	30.0	0.89	14.0
Holland	61	11	36.0	8.17	3.0
Huntington	54	6	30.1	2.65	21.7
Jeffersonville	64	15	37.6	7.05	1.0
Knox	55	3	30.3	2.81	15.8
Kokomo	52[c]	— 1	29.0[c]	4.13	24.0
Lafayette	55	1	29.0	5.97	21.2
Laporte	54	6	29.4	2.21	8.5
Lima	58	9	27.8	1.99	7.5
Logansport	56	5	29.7	2.75	14.9
Madison	67	10	36.7	7.69	4.0
Marengo	63	10	36.7	7.07	1.2
Marion	56	3	30.2	4.09	24.7
Markle	54	0	29.2	4.35	24.5
Mauzy	55	— 1	30.0	5.61	25.5
Moores Hill	62	5	32.7	6.62	9.7
Mount Vernon	63	5	34.7	8.22	2.0
Northfield	53	— 8	28.0	6.41	27.0
Paoli	63	7	35.2	8.18	T.
Plymouth	59	5	30.2	2.52	11.2
Princeton	58	15	36.6	5.50	8.0
Rensselaer	56	4	30.8	2.98	13.8
Richmond	60	— 7	30.4	4.29	19.3
Rockville	58	— 1	31.2	5.03	22.5
Rome	63	9	38.8	6.16	2.0
Salem	62	8	34.3	5.49	T.
Scottsburg	63	11	36.7	7.73	6.0
Seymour	58	17	36.0	7.14	....
Shelbyville	57	1	32.0	5.64	13.4
South Bend	56	6	28.6	2.98	13.8
Syracuse	54	7	30.0	3.43	19.5
Terre Haute	61	8	33.8	5.67	25.5
Valparaiso	55	— 1	30.1	2.59	14.8
Veedersburg	65[d]	— 6[d]	30.8[d]	4.80	19.0
Vevay	63	10	34.2	7.45	20.0
Vincennes	61	9	34.0	6.47	5.5
Washington	60	11	33.6	5.12	2.4
Indian Territory					
Ardmore	75	20	45.4	1.58	
Calvin	....	....	....	1.78	
Durant	76	21	44.9	3.25	
Fairland	71	17	39.6	3.65	T.
Fort Gibson	....	....	....	5.68	
Hartshorne	78	21	39.6	2.23	
Healdton	81	16	48.6	1.84	
Marlow	78	19	43.4	4.08	
Muskogee	75	20	43.2	5.29	
Okmulgee	76	18	43.8	3.89	
Pauls Valley	77	18	44.6	3.65	
Ravia	78	21	47.6	1.94	
Tulsa	73	19	40.0	5.20	T.
Vinita	72	15	40.5	5.61	T.
Wagoner	73	19	43.0	6.48	
Webbers Falls	72	20	43.6	3.65	
Iowa.					
Afton	58	— 2	28.2	2.21	17.0
Albia	59	— 4	27.2	2.01	11.0
Algona	53	— 2	25.8	2.88	3.0
Allerton	56	— 5	28.0	1.45	9.2
Alta	55	— 4	23.0	1.95	7.0
Alton	52	— 5	25.9	1.32	4.5
Amana	54	2	28.9	1.74	5.2
Ames	59	2	27.8	0.58	2.0
Atlantic	60	—11	27.0	1.97	12.0
Audubon	59	— 4	27.3	1.33	7.5
Baxter	58	— 3	26.8	1.54	7.0
Bedford	56	—12	26.9	2.36	16.0
Belleplaine	55	— 2	26.6	3.07	12.2
Bonaparte	58	— 4	28.8	2.40	12.0
Boone	58	2	26.4	2.02	6.7
Britt	55	— 2	26.2	2.86	3.3
Buckingham	....	....	....	2.30	4.6
Burlington	59	0	30.6	4.55	14.5
Carroll	59	— 1	26.5	2.22	6.5
Cedar Rapids	53	— 3	27.2	1.60	6.7
Chariton	56	— 8	27.8	1.70	11.0
Clarinda	57	— 9	26.2	2.06	21.5
Clearlake	50	— 1	24.8	4.23	9.0
Clinton	53	2	29.9	2.86	5.3
College Springs	58	— 9	28.2	1.92	15.5
Columbus Junction	57	— 2	30.4	2.98	15.8
Corning	56	— 8	26.6	2.47	20.5
Corydon	59	— 5	28.2	1.56	15.6
Creston	57	—11	25.8	1.85	15.0
Cumberland	....	....	....	2.62	16.0
Decorah	52	3	26.0	3.18	3.8
Delaware	52	1	25.2	2.06	5.9
Denison	61	1	27.8	4.11	5.7
Desoto	59	— 4	27.9	1.32	7.5
Dows	54	0	25.4	2.54	2.6
Earlham	57	— 6	26.4	2.94	19.5
Elkader	55	4	26.9	3.11	5.0
Elliott	62	— 7	28.4	1.78	15.0

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Iowa—Cont'd.	°	°	°	*Ins.*	*Ins.*
Estherville	52	— 4	23.0	1.22	4.5
Fayette	53	2	25.3	2.99	....
Forest City	52	— 1	23.7	3.06	2.5
Fort Dodge	56	2	26.0	3.00	4.2
Fort Madison	....	....	....	3.85	17.5
Galva	....	0	....	1.45	3.5
Glenwood	63	— 4	28.8	2.95	14.5
Grand Meadow	48	0	25.0	2.86	....
Greenfield	58	— 5	27.4	1.73	13.0
Grinnell (near)	56	— 2	27.2	1.96	7.0
Grundy Center	54	0	26.9	2.78	10.0
Guthrie Center	58	— 1	27.2	1.66	11.1
Hampton	57	1	26.9	3.08	6.6
Hancock	60	— 5	28.1	2.02	8.0
Hanlontown	49	— 2	24.3	2.16	2.5
Harlan	60	— 7	27.2	1.26	7.8
Hopeville	57	— 7	27.3	2.27	....
Humboldt	54	— 1	27.8	3.34	4.0
Idagrove	60	0	27.6	1.24	5.9
Independence	54	3	26.5	0.71	6.0
Indianola	58	— 3	28.4	1.16	11.1
Inwood	53	— 7	23.9	1.07	3.9
Iowa Falls	53	2	26.0	2.77	5.3
Jefferson	59	4	28.6	1.89	8.0
Keosauqua	60	— 2	28.3	2.24	13.6
Knoxville	59	— 2	29.0	1.70	11.0
Lacona	....	....	....	1.97	11.0
Larrabee	56	— 6	26.0	1.35	6.1
Leclaire	....	....	....	2.80	8.0
Lemars	57	— 2	26.4	....	7.5
Lenox	57	— 9	26.6	1.59	9.7
Leon	55	— 2	28.5	2.39	13.3
Little Sioux	64	— 1	28.6	2.45	11.0
Logan	64	— 4	29.2	2.46	10.0
Maple Valley	....	....	....	1.98	7.0
Maquoketa	56	0	26.8	2.88	4.5
Marshalltown	58	1	26.4	2.06	6.8
Mason City	51	0	25.9	3.80	6.4
Mountayr	59	— 6	28.0	1.58	21.2
Mount Pleasant	58	— 3	29.9	3.36	19.6
Mount Vernon	58	0	28.2	2.03	7.7
Muscatine	....	....	....	2.72	8.6
Nevada	....	....	....	2.08	2.8
New Hampton	50	0	24.8	4.03	T.
Northwood	50	— 1	25.0	3.38	1.4
Odebolt	57	1	27.7	1.80	6.2
Ogden	58	2	26.6	1.67	8.8
Olin	63	— 1	29.0	2.04	6.8
Onawa	63	2	28.6	2.00	10.0
Osage	50	1	25.1	4.17	8.8
Oskaloosa	57	— 2	28.6	1.55	13.5
Ottumwa	57	2	30.0	2.84	10.3
Pacific Junction	65	—10	28.5	2.11	13.7
Pella	64	0	29.8	1.08	9.0
Perry	58	— 1	28.8	2.39	12.5
Plover	56	— 3	26.4	1.88	3.0
Pocahontas	53	— 2	26.4	3.01	4.9
Redoak	61	— 2	30.7	2.05	25.2
Ridgeway	56	3	27.5	4.41	3.6
Rock Rapids	64	— 4	24.0	0.75	5.2
Rockwell City	56	1	28.1	3.60	5.5
Sac City	55	1	26.4	1.47	6.8
St. Charles	61	— 1	28.5	2.45	13.7
Sheldon	55	— 7	24.7	2.57	6.2
Sibley	52	— 6	22.8	2.08	4.3
Sigourney	59	— 2	29.7	2.17	13.0
Sioux Center	51	— 5	24.1	1.37	8.0
Stockport	58	— 5	29.9	3.45	25.0
Storm Lake	55	— 3	23.4	1.30	3.3
Stuart	58	— 1	27.4	2.65	19.2
Thurman	62	—14	27.6	2.46	....
Tipton	53	4	29.0	2.23	....
Toledo	56	0	27.6	2.22	11.5
Vinton[e]	52	3	27.0	....	....
Wapello	54	2	29.6	3.05	8.8
Washington	58	— 2	28.8	3.14	3.5
Washta	58	— 2	27.0	0.63	0.2
Waterloo	55	5	27.9	2.14	4.2
Waukee	58	— 3	27.6	3.25	23.3
Waverly	52	5	27.0	2.51	4.2
Webster City	57	3	28.4	2.33	5.5
Westbend	57	— 4	25.6	2.66	3.9
Whitten	53	— 2	27.0	1.71	4.0
Wilton Junction	54	1	29.0	....	....
Winterset	56	— 3	27.4	2.31	14.5
Woodburn	57	— 9	29.0	2.56	11.5
Zearing	56	0	27.2	2.11	6.3
Kansas.					
Abilene	....	....	....	0.84	6.4
Alton	74	1	32.7	2.46	....
Anthony	....	....	....	1.28	5.0
Atchison	60	4	31.6	2.27	11.8
Baker	63	— 3	27.8	3.33	16.5
Beloit	....	....	....	1.13	....
Blue Rapids	....	....	....	1.36	9.9
Burlington	69	— 2	34.8	1.96	7.0
Chapman	69	9	31.6	1.08	6.9
Cimarron	80	7	32.7	1.15	5.0

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
***Kansas*—Cont'd.**					
Clay Center	70	− 2	30.9	1.51	10.0
Colby	67	− 6	27.8	1.52	13.1
Columbus	72	13	37.8	3.47	0.5
Coolidge	79	− 1	32.8	0.72	7.0
Cottonwood Falls	68	0	33.9	1.60	11.4
Cunningham	72	10	34.8	0.91	6.8
Dresden	75	− 2	30.6	1.79	14.8
Eldorado	67	6	34.9	1.59	1.8
Ellinwood	72	8	34.6	0.96	13.1
Ellsworth	73	6	31.2	2.07	14.8
Emporia	66	4	33.0	1.23	5.8
Englewood	83	13	38.2	1.16	3.5
Enterprise	69	8	32.4	1.26	7.0
Eureka	......	......	......	1.25	4.2
Fall River	70	8	36.0	2.07	2.5
Farnsworth	81	3	32.3	0.92	8.5
Forsha	72	9	34.5	1.60	4.0
Fort Scott	72	8	36.5	1.51	3.6
Frankfort	69	− 7	31.0	2.27	15.2
Fredonia	71	6	73.0	1.56	T.
Garden City	82	7	33.4	1.60	13.2
Garnett	69	2	33.8	1.43	4.5
Gove*[1]	78	14	29.5	1.55	15.0
Grenola	68	7	35.4	1.04	2.5
Harrison	71	−15	29.0	1.27	9.8
Hays	72	4	31.9	0.73	9.5
Horton	63	0	30.2	1.66	10.0
Hoxie	73	− 4	29.7	1.35	13.5
Hugoton	81	6	36.2	0.80	2.5
Hutchinson	71	10	34.1	2.49	7.0
Independence	70	15	37.6	2.25	0.6
Jetmore	78	8	34.2	0.91	10.2
Jewell	72	0	30.0	2.33	20.5
La Crosse	74	5	32.6	0.63	7.8
Lakin	79	5	32.8	0.72	7.0
Larned	73	6	32.2	0.70	5.5
Lebo	66	1	32.6	1.70	6.3
Lindsborg	......	......	......	0.77	5.1
Macksville	71	8	35.6	1.21	7.0
McPherson	72	9	33.0	2.60	10.0
Madison	67	− 2	32.8	1.49	4.0
Manhattan *b*	70	2	32.8	2.12	10.0
Manhattan *c*	70	2	31.4	1.91	14.0
Marion	68	4	34.0	2.30	5.0
Medicine Lodge	74[e]	15[k]	37.7[h]	1.46	5.0
Minneapolis	70	4	32.4	1.11	12.0
Moran	70	5	34.7	1.40	2.0
Neosho Rapids	......	......	......	1.16	4.5
Norton	71	−11	29.4	2.22	16.8
Norwich	70	10	35.8	1.74	2.8
Oberlin	......	......	......	2.35	22.0
Osage City	68[c]	7[c]	33.8[c]	1.63	6.8
Oswego	71	13	37.7	1.76	1.0
Ottawa	69	− 4	32.8	2.09	10.2
Pittsburg	72	11	35.8	1.98	2.0
Plainville	......	......	......	1.74	17.0
Pleasanton	67	5	34.2	2.18	4.0
Pratt	71	10	35.9	1.33	9.2
Republic	70	−14	29.5	1.74	11.5
Rome	70	13	37.2	1.82	7.0
Russell	78	4	32.6	1.51	13.5
Salina	72	10	33.5	1.08	11.0
Scott	77	5	31.5	0.45	4.5
Sedan	68	13	36.0	2.36	T.
Toronto	67	3	32.2	1.15	2.0
Ulysses	75	5	32.4	0.60	6.0
Valley Falls	63	− 1	31.2	1.71	8.5
Wakeeney	78	1	31.2	0.69	10.0
Wakeeney (near)	......	......	......	1.15	10.8
Wallace	74	− 3	29.4	1.69	16.8
Walnut	70	10	35.9	1.16	1.0
Wamego*[1]	66	6	32.0	2.12	16.8
Winfield	69	10	38.0	1.52	2.2
Yates Center	72[f]	3[f]	34.8[f]	......	1.5
Kentucky.					
Alpha	69	21	43.7	5.95	T.
Anchorage	66	12	35.8	6.28	1.0
Bardstown	66	15	38.8	8.34	1.0
Beattyville	70	12	38.8	5.64	1.0
Beaver Dam	69	17	37.8	6.45	T.
Berea	69	14	40.5	5.93	......
Blandville	66	18	38.9	6.82	T.
Bowling Green	72	20	40.4	6.08	0.5
Burnside	72	19	44.3	6.02	0.1
Cadiz	71	20	41.4	5.67	T.
Calhoun	65	17	40.2	6.17	0.6
Catlettsburg	71	15	39.8	5.72	2.0
Earlington	75	19	38.0	6.46	0.2
Edmonton	70	18	41.2	7.25	0.2
Eubank	68	13	38.3	6.34	0.9
Falmouth	......	......	......	6.95	5.0
Farmers	70	10	38.5	6.48	2.5
Frankfort	68	14	39.4	7.56	1.1
Greensburg	64	15	39.2	7.26	T.
High Bridge	72[d]	14	39.6[b]	6.41	0.7
Hopkinsville	70	20	40.6	6.21	
Irvington	65	14	38.6	6.41	0.6
Jackson	71	12	41.4	5.47	2.5
***Kentucky*—Cont'd.**					
Leitchfield	68	15	38.0	7.13	1.5
Loretto	72	8	41.5	7.82	1.0
Lynnville	70	15	40.8	6.03	T.
Manchester	70	17	42.8	3.67	T.
Marion	63	16	38.6	6.50	......
Maysville	72	3	35.9	6.91	5.2
Middlesboro	70	17	44.8	3.70	
Mount Sterling	66	11	38.1	9.10	13.8
Owensboro	65	18	37.6	5.59	2.5
Owenton	62	12	34.8	4.83	1.5
Paducah	67	20	39.6	7.24	0.3
Richmond	70	10	39.2	6.21	......
St. John	66	12	36.2	8.44	1.0
Scott	65	8	34.4	6.78	7.8
Shelby City	69	10	38.2	6.85	1.8
Shelbyville	75	11	36.9	6.86	2.8
Taylorsville	69	15	38.7	7.52	1.0
Williamsburg	74	20	43.8	2.62	0.5
Williamstown	66	8	35.4	6.09	4.6
Louisiana.					
Abbeville	81	32	60.1	3.80	
Alexandria	82	29	56.3	6.86	
Amite	80	29	56.4	9.79	
Baton Rouge	81[c]	32	57.4[c]	7.59	
Burnside	79	30	58.7	7.48	
Calhoun	81	26	52.8	7.57	
Cameron	74	34	57.6	3.65	
Cheneyville	81	31	56.2	7.84	
Clinton	80	29	56.0	16.18	
Collinston	81	28	52.4	6.73	T.
Covington	78	29	55.9	10.84	
Donaldsonville	85	31	61.0	5.92	
Farmerville	......	......	......	6.85	T.
Franklin	82	32	58.8	3.09	
Georgetown	82[c]	29[d]	56.6[d]	7.46	
Grand Coteau	80	32	58.5	12.83	
Hammond	78	30	57.5	9.37	
Houma	83	30	59.4	3.70	
Jennings	79	33	58.4	6.05	
Lafayette	80	32	57.7	6.22	
Lake Charles	83	32	60.3	3.20	
Lakeside	80	34	58.2	3.25	
Lawrence	78	37	59.1	2.92	
Libertyhill	85	28	54.0	5.90	
Logansport	......	......	......	6.60	
Melville	86	30	56.4	15.63	
Minden	78	26	52.0	5.13	
Monroe	82	32	53.7	6.68	T.
Morgan City	......	......	......	2.24	
New Iberia	77[i]	33[i]	59.8[i]	2.95	
Opelousas	80	32	56.9	14.61	
Oxford	81	22	54.2	5.91	
Plain Dealing	81	25	52.2	4.32	
Rayne	78	33	58.0	7.01	
Reserve	78	34	59.0	......	
Robeline	80	26	52.8	4.95	
St. Francisville	86	32	58.0	......	
Schriever	83	30	59.4	2.50	
Simmesport	......	......	......	7.64	
Southern University	......	......	......	7.01	
Sugar Experiment Station	79	36	59.6	6.36	
Sugartown	79	30	56.7	4.84	
Maine.					
Bar Harbor	52	2	27.8	8.10	26.0
Chesuncook	......	......	......	4.94	41.8
Cornish	54	− 2	25.8	3.67	22.5
Danforth	......	......	......	4.94	31.6
Debsconeag	50	−11	20.4	5.55	41.5
Farmington	55	−12	22.8	4.30	29.5
Fort Fairfield	51	−24	15.8	2.99	34.0
Gardiner	53	−13	24.9	4.86	27.7
Houlton	48	−16	20.3	3.20	42.0
Lewiston	53	− 8	24.7	4.51	31.0
Madison	51	−12	22.2	4.83	21.0
Mayfield	47	− 5	22.8	5.24	43.0
Millinocket	49	−15	20.4	6.29	31.0
North Bridgton	54	− 3	24.6	3.87	25.0
Orono	50	−10	23.4	4.34	21.7
Patten	50	−11	22.2	5.90	51.0
Rumford Falls	56	− 5	23.4	2.79	20.0
The Forks	......	......	......	4.20	36.0
Thomaston	50	− 6	27.0	5.07	19.0
Vanburen	50	−27	14.4	......	......
Winslow	52	−12	24.8	3.33	20.0
Maryland.					
Annapolis	60	19	39.2	5.78	7.5
Bachmans Valley	56	10	34.6	7.18	15.0
Cambridge	60	22	40.0	4.74	4.8
Cheltenham	61	14	37.0	4.83	4.3
Chestertown	60	20	38.0	6.11	6.5
Chewsville	61	8	34.0	2.78	9.9
Clearspring	60	12	33.2	4.18	23.0
Coleman	60	20	38.0	5.05	9.0
Collegepark	63	11	37.8	4.35	4.4
Cumberland	......	......	......	3.39	14.0
Darlington	59	13	35.5	5.67	15.0
Deerpark	58	0	29.6	4.88	27.2
Denton	......	......	......	5.54	5.3
***Maryland*—Cont'd.**					
Easton	60	20	38.4	4.71	2.6
Fallston	62	14	35.0	5.20	8.3
Frederick	60	13	36.6	4.33	......
Frostburg	......	......	......	5.76	27.0
Grantsville	56	1	29.8	5.40	32.0
Great Falls	68	12	37.6	5.37	......
Greenspring Furnace	62	10	34.8	3.96	18.3
Harney	......	......	......	3.99	12.5
Jewell	60	17	38.1	5.58	4.5
Johns Hopkins Hospital	......	......	......	4.41	......
Keedysville	62	13	36.2	4.32	11.5
Lake Montebello	64	16	36.6	4.44	9.5
Laurel	63	15	38.1	5.56	9.5
McDonogh	64	16	35.6	4.63	6.6
Mount St. Marys College	......	......	......	4.06	12.6
New Market	60	16	35.4	5.25	11.5
Oakland	57	8	30.8	5.18	26.5
Pocomoke City	62	22	41.8	4.84	......
Porto Bello	58	15	39.8	3.66	4.0
Prince Fredericktown	60	17	38.7	5.92	7.2
Princess Anne	63	18	40.6	4.40	3.0
Solomons	57	23	39.7	4.66	4.6
Sudlersville	62	18	39.0	6.73	......
Takoma Park	63	20	37.8	4.62	8.1
Van Bibber	58	18	37.2	5.12	......
Westernport	61	5	34.3	2.22	11.9
Woodstock	65	12	37.8	3.81	7.1
Massachusetts.					
Amherst.*	53	− 8	28.0	4.90	20.2
Bedford	53	4	30.0	5.60	21.5
Bluehill (summit)	54	4	29.5	6.04	26.0
Cambridge	56	1	32.1	7.32	......
Chestnuthill	55	5	31.3	7.42	19.5
Concord	54	− 1	28.6	5.66	25.2
East Templeton*[1]	54	6	27.0	5.17	23.5
Fallriver	53	8	32.4	6.88	18.0
Fitchburg	55	− 2	28.5	4.67	27.0
Framingham	55	0	29.3	6.13	21.0
Groton	58	− 4	26.9	4.79	29.0
Hyannis	......	......	......	8.45	18.5
Jefferson	......	......	......	5.42	23.8
Lawrence	54	4	29.0	5.77	30.0
Leominster	......	......	......	4.42	23.0
Lowell	54	3	30.7	5.97	......
Ludlow Center	47	− 7	24.4	5.20	......
Middleboro	58	3	31.0	6.06	14.5
Monson	51	− 3	28.8	5.05	23.0
New Bedford	55	9	33.2	5.73	14.0
Pittsfield	......	......	......	4.87	29.0
Plymouth	57	7	31.6	8.69	7.0
Princeton	......	......	......	5.08	22.2
Provincetown	50	9	34.0	6.80	16.5
Salem	......	......	......	6.79	25.0
Somerset*[1]	56	5	32.0	6.02	18.0
Sterling	......	......	......	4.60	24.2
Taunton	56	0	30.4	6.85	10.0
Westboro	55	− 1	30.8	5.92	21.0
Weston	52	1	28.8	4.64	22.8
Williamstown	48	− 2	26.3	2.33	16.7
Winchendon	......	......	......	3.89	22.5
Worcester	54	4	29.6	4.50	23.2
Michigan.					
Adrian	58	3	28.4	1.55	4.0
Agricultural College	51	− 1	26.2	1.86	9.0
Allegan	52[g]	8[g]	28.0[g]	1.70	7.0
Alma	49	− 5	26.4	2.01	5.7
Ann Arbor	55	3	27.6	2.36	11.2
Arbela	52	− 2	27.4	2.45	7.7
Ball Mountain	50	− 6	26.0	1.60	8.1
Baraga	......	......	......	1.30	13.0
Battlecreek	50	4	28.2	2.47	7.5
Bay City	48	0	24.2	2.18	10.5
Benzonia	45	3	23.9	2.65	10.0
Berlin	49	− 4	25.6	1.38	8.9
Big Rapids	50	− 7	25.9	2.65	5.0
Birmingham	50	− 1	27.1	1.23	7.8
Bloomingdale	53	− 8	28.7	2.10	5.0
Calumet	42	− 8	19.2	2.04	25.0
Carsonville	43	− 7	24.6	1.80	8.9
Cassopolis	57	5	29.0	3.40	7.0
Charlevoix	......	......	......	1.30	13.0
Charlotte	54	− 2	27.2	2.15	7.0
Chatham	44	−18	15.8	1.68	16.2
Cheboygan	50	− 6	21.1	0.84	6.0
Clinton	55	− 2	28.0	1.71	7.2
Coldwater	63	3	30.7	2.37	12.0
Concord	51	− 3	26.8	2.56	7.3
Dundee	57	2	28.8	2.42	11.2
Eagle Harbor	45	− 6	21.6	1.56	......
East Tawas	46	− 5	23.4	1.12	7.0
Eloise	55	2	27.4	1.16	6.5
Flint	53	0	26.5	2.03	12.5
Gaylord	50	......	......	......	7.5
Grand Marais	49	− 5	21.4	2.70	23.5
Grape	54	3	28.0	1.29	7.5
Grasslake	48	− 5	24.6	2.48	16.0
Grayling	48	−18	22.1	2.30	18.0
Hagar	53	8	28.2	3.19	11.7

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Michigan—Cont'd.	°	°	°	*Ins.*	*Ins.*
Harbor Beach	40	5	24.6	0.55	1.5
Harrison	47	−3	24.0	2.20	10.0
Harrisville	45	−7	24.2	3.59	19.2
Hastings	53	0	28.0	2.23	10.3
Hayes	49	0	25.2	3.37	7.0
Highland	.....	.....	.....	2.37	9.7
Hillsdale	53[f]	3[f]	26.6[f]	1.71	4.0
Holland	58	4	30.4	2.26	4.0
Howell	52	−3	26.5	1.12	4.8
Humboldt	39	−35	11.7	2.70	27.0
Iron Mountain	47	−14	18.6	2.12	18.0
Ironwood	47	−14	17.8	1.50	15.0
Ishpeming	44	−23	13.4	.....	.....
Ivan	48	−15	20.4	1.36	10.0
Jackson	54	4	28.8	2.21	12.0
Jeddo	48	−3	25.8	1.84	13.4
Kalamazoo	53	5	27.3	2.36	13.5
Lansing	53	2	27.6	2.02	7.7
Ludington	50	6	27.9	2.55	9.5
Mackinac Island	42	−8	19.3	1.22	12.1
Mackinaw City	52	−6	18.2	0.76	7.6
Mancelona	52	−9	22.0	0.80	8.0
Maple Ridge	45	−20	16.2	1.90	16.0
Menominee	43	−6	21.8	1.05	10.5
Mio	45	−15	21.7	3.13	17.5
Montague	54	2	27.6	1.72	2.5
Mount Clemens	53	4	26.6	0.86	4.6
Muskegon	55	4	27.4	1.59	T.
Newberry	42	.....	.....	2.01	10.1
Old Mission	42	1	23.0	1.86	7.7
Olivet	50	2	26.2	2.69	11.3
Omer	48	−11	23.2	1.90	7.5
Onaway	47	−10	19.5	0.90	9.0
Owosso	50[e]	−2[e]	26.2[e]	1.41	6.0
Petoskey	45	−2	22.2	1.20	10.0
Plymouth	55	−1	27.6	1.65	6.0
Pontiac	59	−5	27.4	1.25	9.0
Port Austin	45	1	24.6	1.25	2.5
Powers	50	−8	22.5	1.80	18.0
Reed City[e]	55	−12	26.0	.....	.....
Saginaw (W. S.)	51	1	27.0	1.77	8.2
St. James	40	−1	21.4	2.35	16.1
St. Johns	54	1	28.0	2.06	13.5
St. Joseph	56	11	30.0	3.24	7.9
Slocum	50	2	27.1	1.58	.....
Somerset	53	−1	25.9	1.85	5.0
South Haven	55	7	27.3	2.24	8.0
Staunton	60	0	26.5	2.01	5.1
Thomaston	50	−31	14.8	0.60	6.0
Thornville	56	−10	28.0	2.73	11.0
Traverse City	44	−1	24.0	2.06	12.5
Vassar	52	−1	26.8	3.65	12.0
Wasepi	56	5	27.8	2.61	7.5
Webberville	52	−7	26.7	3.03	8.0
West Branch	45	−12	22.4	2.26	20.0
Wetmore	41[e]	−15[e]	16.8[e]	1.85	18.5
Whitefish Point	36	−15	17.2	3.68	20.4
Woodlawn	43	−23	18.4	3.05	24.0
Ypsilanti	54	0	27.8	2.17	12.1
Minnesota.					
Albert Lea	51	−1	23.9	2.15	2.0
Alexandria	51	−13	17.8	0.61	9.0
Amboy	51[e]	−2[e]	23.8[e]	1.86	.....
Angus	57	−18[e]	19.0[e]	0.10	.....
Ashby	50	−12	19.9	0.94	10.2
Bagley	48	−33	15.0	.....	.....
Beardsley	56	−15	21.4	1.85	10.5
Bird Island	53	−5	21.8	0.41	3.1
Brainerd	49	−15	19.3	.....	.....
Caledonia	48	0	24.1	2.91	2.0
Collegeville	52	−10	21.5	1.17	7.7
Crookston	54	−16	17.1	0.48	2.8
Detroit	50	−26	16.4	9.51	6.5
Fairmont	.....	.....	.....	2.30	3.2
Faribault	49	−3	22.8	1.77	T.
Farmington	48	−4	22.7	2.63	6.0
Fergus Falls	55	−9	22.3	0.97	9.4
Floodwood[e]	54	−26	17.2	.....	.....
Glencoe	52	−5	23.4	0.40	1.0
Grand Meadow	52	−2	23.2	2.76	2.8
Hallock	58	−23	17.8	0.23	1.8
Hinckley	48	−12	19.2	.....	.....
Hovland	50	−28	16.0	1.50	17.0
Lake Winnibigoshish	50	−21	17.6	0.91	12.8
Leech	51	−23	13.6	1.01	10.0
Little Falls	51	−12	19.8	0.70	7.0
Long Prairie	52	−15	18.4	0.76	6.5
Luverne	51	−4	23.4	0.65	6.2
Lynd	52	−12	21.2	1.11	11.0
Mankato	.....	.....	.....	1.53	0.4
Mapleplain	50	−7	21.6	1.36	10.3
Milaca	51	−12	20.4	.....	.....
Milan	54	−12	20.9	1.05	9.5
Montevideo	53	−8	21.8	0.63	5.5
Mora	49	−14	19.1	0.65	9.5
Morris	51	−13	20.6	0.72	7.2
Mount Iron	54	−23	17.2	0.91	9.1
New London	58	−14	18.2	0.68	5.5

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Minnesota—Cont'd.	°	°	°	*Ins.*	*Ins.*
New Richland	53	−1	25.6	1.34	0.9
New Ulm	61	−2	26.3	1.53	13.0
Park Rapids	49	−19	14.8	0.95	8.5
Peterson	.....	.....	.....	3.17	4.6
Pine River	49	−25	16.6	1.08	11.4
Pipestone	50	−7	21.5	1.20	3.0
Pokegama Falls	52	−28	16.2	1.10	10.9
Redwing	46	−2	24.6	2.22	5.0
Reeds	.....	.....	.....	0.80	5.1
St. Charles	49	1	24.4	2.82	.....
St. Cloud	55	−12	21.6	1.03	7.5
St. Peter	53	−2	25.4	1.14	3.3
Sandy Lake Dam	50	−21	17.6	0.54	10.5
Shakopee	50	−4	23.6	1.35	6.0
Stillwater	.....	.....	.....	0.73	4.9
Thief River Falls	56	−20	17.2	.....	.....
Tonka	.....	.....	.....	0.48	.....
Two Harbors	49	−14	21.4	0.86	12.0
Wabasha	53	−2	25.4	2.15	3.5
Wadena	48	−18	15.7	0.66	11.0
Willow River	50	−22	16.0	0.84	7.4
Winnebago	57	−4	26.0	1.90	0.7
Winona	46	2	23.0	2.50	3.2
Worthington	50	−6	21.4	0.80	8.0
Zumbrota	49	−2	23.6	1.25	T.
Mississippi.					
Aberdeen	75	26	49.9	6.02	
Austin	79	27	48.4	5.42	T.
Batesville	77	26	47.1	5.33	
Bay St. Louis	76	29	57.4	10.94	
Biloxi	75	32	58.4	10.08	
Booneville	72	26	47.2	4.81	T.
Brookhaven	80	28	54.0	9.85	
Canton	77	29	52.9	7.81	
Columbia	.....	.....	.....	9.34	
Columbus	75	25	49.6	7.54	
Corinth	71	28	45.8	5.04	
Crystal Springs	81	28	53.4	12.13	
Duck Hill	76	25	50.4	6.76	
Edwards	80	28	53.8	10.13	
Fayette	81	28	54.2	11.31	
Fayette (near)	.....	.....	.....	11.48	
Greenville[b]	79	29	50.8	5.44	
Greenwood	78	29	50.2	6.15	
Hattiesburg	76	27	53.6	8.78	
Hazlehurst	82	26	53.6	11.15	
Hernando	74	24	44.8	4.85	T.
Holly Springs	74	26[e]	44.0[e]	4.21	T.
Indianola	77	28	49.0	5.44	T.
Jackson	81	27	53.6	8.81	
Kosciusko	76	27	49.2	10.87	
Lake	81	24	51.2	9.64	
Lake Como	81	25	52.8	12.24	
Laurel[b]	78	28	52.5		
Leakesville	82	26	56.0	7.92	
Louisville	75	25	50.8	6.46	
McNeill	79	28	57.1		
Macon	75	28	50.0	6.40	
Magee	81	24	53.2	11.29	
Magnolia	80	27	56.4	10.92	
Merrill	.....	.....	.....	12.28	
Natchez	83	30	56.5	12.01	
Nitta Yuma	76	32	52.4	4.27	
Patmos	.....	.....	.....	5.91	
Pearlington	77	29	56.2	12.11	
Pecan	74	29	57.4	7.25	
Pittsboro	76	24	49.7	3.88	
Pontotoc	73	28	48.6	5.68	T.
Port Gibson	.....	.....	.....	9.63	
Porterville	76	25	51.5	8.99	
Quitman	80	26	53.3	14.61	
Ripley	76	23	47.6	5.62	T.
Shoccoe	78	28	53.4	6.95	
Shubuta	.....	.....	.....	10.62	
Stonington	.....	.....	.....	9.62	
Suffolk	80	25	56.2	10.42	
Swan Lake	76	29	51.0	4.05	
Tchula	77	29	52.7	7.72	
Tupelo	76	24	47.4	6.35	
University	77	27	48.9	6.17	T.
Utica	80	29	53.4	13.19	
Walnutgrove	77	26	52.5[d]	8.21	
Watervalley	76	27	49.2	7.50	T.
Waynesboro	86	24	54.3	10.80	
Woodville	78	30	55.8	10.18	
Yazoo City	78	30	51.6	7.84	
Missouri.					
Albany	.....	.....	.....	1.80	15.0
Appleton City	69	1	33.8	2.49	15.1
Arlington	.....	.....	.....	3.88	5.0
Arthur	68	6	35.7	1.75	4.0
Avalon	59	0	30.1	2.46	12.5
Belle	65	6	34.3	2.09	5.5
Bethany	56	−5	29.0	2.14	11.5
Birchtree	67	14	37.7	7.50	3.0
Blue Springs	63[i]	0	32.4[f]	2.92	8.2
Bolivar	68	10[e]	37.5[d]	3.63	T.
Boonville	.....	.....	.....	1.74	9.7

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Missouri—Cont'd.	°	°	°	*Ins.*	*Ins.*
Brunswick	63	2	30.0	3.24	19.3
Cape Girardeau	.....	.....	.....	6.28	3.0
Caruthersville	74	20	41.5	7.83	T.
Conception	60	0	29.0	1.92	13.0
Darksville	59	2	31.0	3.63	11.2
Dean	73	11	39.4	4.89	T.
Decaturville	69	6	34.8	2.39	2.0
De Soto	64	12	35.5	6.41	11.4
Doniphan	67	18	40.5	5.28	.....
Eldorado Springs	69	8	36.8	1.77	5.0
Fairport	.....	.....	.....	2.17	11.9
Fayette	59	5	30.2	2.23	12.5
Fulton	64	3	33.5	3.15	12.4
Gallatin *[1]	60	4	31.2	2.24	7.7
Gano	67	9	34.6	4.29	10.3
Glasgow	.....	.....	.....	3.67	8.0
Goodland	65	7	35.6	7.53	17.0
Gorin	.....	.....	.....	1.80	8.0
Grant City	60	−2	29.0	1.59	9.2
Harrisonville	62	4	31.4	2.21	9.2
Hazlehurst	.....	.....	.....	1.75	6.5
Hermann	.....	.....	.....	3.18	1.7
Houston	66	13	36.6	5.72	3.0
Ironton	67	8	35.2	6.72	11.7
Jackson	67	15	39.2	6.83	.....
Jefferson City	65	6	32.0	2.30	14.9
Joplin	75	13	36.8	4.51	T.
Kidder	56	1	29.4	1.85	7.3
Koshkonong	67	14	38.0	8.83	.....
Lamar	70	10	37.1	1.84	1.5
Lamonte	.....	.....	.....	2.08	8.0
Lebanon	66	8	34.3	4.04	5.0
Lexington	63	6	31.7	3.27	14.0
Liberty	64	3	30.7	2.38	21.6
Lockwood	69	10	35.7	2.92	2.0
Louisiana	60	4	31.6	3.24	16.0
Macon	59	0	31.0	2.70	16.0
Marblehill	64[e]	15[d]	37.7[e]	7.91	5.0
Marshall	62	4	31.7	2.46	12.5
Maryville	61	−1	27.1	1.91	14.1
Mexico	63	4	30.1	2.43	15.3
Monroe	59	−4	29.4	2.68	12.7
Montgomery City	62	4	31.8	3.38	17.3
Mountain Grove	65	12	35.6	5.90	0.8
Mount Vernon	70	12	37.2	5.31	2.4
Neosho	73	14	39.3	4.38	0.5
New Haven	65	11	35.4	6.09	18.0
New Madrid	.....	.....	.....	6.42	.....
New Palestine	68	7	35.6	1.75	11.0
Oakfield	65	8	34.2	4.15	13.7
Olden	71	12	38.5	7.41	T.
Oregon	60	−1	29.8	1.84	13.0
Osceola	.....	.....	.....	2.41	.....
Princeton	58	0	30.2	2.45	19.5
Rockport	.....	.....	.....	3.42	18.0
Rolla	.....	.....	.....	4.06	6.7
St. Charles	63	5	33.6	4.74	15.0
St. Joseph	.....	.....	.....	1.43	9.0
Sarcoxie	.....	.....	.....	5.01	0.2
Sedalia	64	2	33.2	2.28	11.0
Seymour	66	9	35.1	4.75	1.2
Sikeston	63	19	39.8	8.09	1.5
Steffenville	59	1	30.6	3.04	14.0
Sublett	56	−5	29.2	3.20	11.5
Trenton	55	4	30.7	2.13	13.5
Unionville	58	1	27.8	2.61	14.0
Versailles	73	4	35.6	2.63	7.8
Warrensburg	62	4	33.6	2.60	.....
Warrenton	62	6	30.7	4.08	15.3
Warsaw	70	7	35.6	3.12	8.7
Wheatland	.....	.....	.....	1.99	6.0
Willowsprings	63	10	34.6	7.91	.....
Windsor	66	1	33.6	1.77	7.3
Zeitonia	67	14	38.0	5.40	T.
Montana.					
Absarokee	.....	.....	.....	2.95	31.0
Adell	65	−39	22.5	1.50	15.0
Anaconda	62	−17	25.3	0.81	.....
Augusta	70	−35	23.2	0.70	7.0
Bear Creek	65	−28	22.6	0.86	7.0
Billings	75	−22	28.2	0.78	15.5
Boulder	65	−28	25.4	0.83	.....
Bozeman	60	−22	22.0	0.92	.....
Butte	60	−18	23.0	0.90	9.0
Canyon Ferry	67	−25	26.6	0.61	6.2
Cascade	72	−31	27.2	0.63	9.1
Chester	65	−33	22.0	0.60	6.0
Chinook	75	−25	25.0	0.15	.....
Choteau	71	−28	24.3	0.31	.....
Clear Creek	71	−8	27.5	0.40	4.0
Columbia Falls	67	−8	29.0	0.32	1.5
Cooke	.....	.....	.....	0.73	7.3
Copper	.....	.....	.....	1.39	14.5
Crow Agency	71	−20	26.6	1.75	14.0
Culbertson	65	−26	21.1	0.04	.....
Dayton	67	−9	30.3	0.51	1.2
Decker	71	−26	24.4	1.00	10.0
Deerlodge	64	−20	23.5	0.47	.....

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Montana—Cont'd.	°	°	°	Ins.	Ins.
Dillon	60	-20	26.0	1.38	13.4
Ekalaka	63	-20	23.9	0.13	...
Evans	67	-26	24.1	1.06	...
Fallon	69	-21	22.6	T.	T.
Forsyth	72	-20	25.1	1.24	12.0
Fort Benton	73	-30	26.2	0.50	5.0
Fort Harrison	69	-23	24.6	...	...
Fort Logan	55	-45	18.2	...	...
Glasgow	69	-32	21.4	0.14	2.0
Glendive	68	-22	25.4	0.73	7.3
Gold Butte	...	...	...	0.56	5.7
Graham	66	-26	24.7	0.53	7.2
Grave Creek Cabin	68	-9	31.0	0.42	0.2
Greatfalls	68	-24	26.2	0.73	...
Hamilton	70	-13	30.5	0.99	14.0
Highwood	...	...	...	0.24	6.5
Homepark	...	...	...	1.70	12.0
Jordan	64	-28	21.6	0.40	1.0
Lakeview	...	...	...	2.75	30.0
Lame Deer	70	-21	25.6	1.30	13.0
Lewistown	72	-25	26.4	0.80	12.8
Livingston	66	-25	25.3	1.54	16.0
Lodge Grass	71	-23	24.6	0.24	5.0
Malta	73	-26	24.0	0.02	0.2
Marysville	60[b]	-21	23.4	1.75	16.0
Millets Ranch	...	...	...	0.31	3.0
Missoula	71[a]	-7[f]	29.0[e]	0.81	1.5
Nye	...	...	...	2.73	32.9
Ovando	60	-27	22.2	0.37	4.5
Philipsburg	65	-21	24.9	0.80	4.4
Plains	68	-11	31.4	0.50	5.0
Poplar	67	-29	21.8	0.40	4.0
Raymond	...	...	...	1.11	9.3
Redlodge	57	-24	20.0	2.06	22.3
Ridgelawn	66	-30	19.3	0.00	
St. Pauls	79	-21	29.6	1.18	13.2
St. Peter	64	-21	25.7	1.03	16.5
Saltese	...	...	...	0.16	2.0
Springbrook	67	-35	22.7	0.65	6.5
Steele	74	-26	26.6	0.75	8.0
Tokna	68	-28	23.0	0.60	6.0
Toston	62	-26	29.2	0.56	5.0
Twin Bridges	64	-22	25.2	0.20	2.0
Utica	68	-25	24.4	0.43	6.0
Virginia City	60	-16	22.2	0.65	6.5
Warrick	...	...	...	0.51	5.1
Whitlash	70	-25	25.4	0.26	2.3
Wolf Creek	67	-31	25.6	0.91	10.9
Wolsey	59	-42	17.4	0.56	12.4
Yale	66	-26	23.3	1.00	10.0
Nebraska					
Agate	69	-28	22.2	1.05	15.4
Agee*[1]	56	-6	22.4	1.55	14.5
Ainsworth	60	-20	23.4	3.02	20.7
Albion	56	-15	25.4	1.16	9.0
Alliance	66[k]	-20	24.2[f]	1.30	8.5
Alma	64	-14	28.2	0.95	11.2
Arapaho	...	...	...	1.87	17.0
Arcadia	...	...	...	0.70	7.0
Ashland	65	-8	28.8	2.00	17.8
Ashton	...	...	...	0.20	...
Auburn	66	-10	29.2	3.80	21.5
Aurora	58	-10	27.6	1.10	11.0
Beatrice	67	-11	29.8	2.09	18.0
Beaver	73	-7	29.9	1.28	13.0
Bellevue	63	0	29.4	3.42	18.4
Benkleman	...	...	...	2.30	23.0
Blair	64	-2	28.0	1.67	9.2
Bloomfield	54	-10	25.6	1.90	14.2
Bluehill	...	...	...	2.15	17.5
Bradshaw	...	...	...	2.03	6.2
Bridgeport	70	-20	24.5	3.20	32.0
Broken Bow	58	-10	25.4	0.62	6.2
Burchard	...	...	...	2.26	19.5
Burge	...	...	...	2.19	19.0
Burwell	...	...	...	1.23	11.5
Callaway	61	-7	26.0	1.00	8.0
Central City	...	...	...	2.65	12.5
Chester	...	...	...	2.03	9.3
Clearwater	56	-13	24.4	0.49	3.7
Columbus	64	-7	25.0	0.99	9.2
Crete	66	-9	28.2	2.63	15.8
Culbertson	69	-8	30.8	1.53	29.0
David City	64	-7	26.7	2.20	17.6
Dawson	67	1	29.8	2.08	...
Dubois	...	...	...	2.49	...
Duff	...	...	...	1.35	10.0
Dunning	...	...	...	1.10	11.0
Edgar	...	...	...	2.05	18.5
Ellis	...	...	...	2.15	17.5
Ericson	...	...	...	1.20	12.0
Ewing	...	...	...	0.90	9.0
Fairbury	68	-11	28.2	1.63	15.8
Fairmont	67	-15	24.8	3.03	25.0
Fort Robinson	72	-25	21.5	1.80	18.0
Franklin	67[d]	-1[d]	30.4[d]	2.30	17.3
Fremont	64	-11	27.6	2.07	11.5
Fullerton	...	...	...	1.75	14.0

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Nebraska—Cont'd.	°	°	°	Ins.	Ins.
Geneva	68	-11	27.2	3.16	22.0
Genoa (near)	57	-7	26.4	2.06	11.5
Gering	73	-20	26.4	2.05	26.0
Gordon	...	...	...	1.16	6.8
Gosper	...	...	...	1.85	18.5
Gothenburg	64	-8	26.8	1.33	15.5
Grant	65	-11	25.7	2.54	22.0
Greeley	...	...	...	0.50	5.0
Guide Rock	...	...	...	2.43	22.5
Haigler	...	...	...	1.55	18.0
Halsey	61	-15	25.6	0.84	...
Hartington	52	-9	25.0	1.95	13.5
Harvard	68	-12	25.7	1.47	11.7
Hastings*[1]	61	2	26.9	3.02	28.5
Hayes Center	56	-3	26.2	4.42	...
Hay Springs	70	-23	23.4	1.70	17.0
Hebron	69	-8	28.6	1.92	17.0
Hendley	...	...	...	2.06	19.0
Hickman	...	...	...	2.45	14.5
Holbrook	60	-10	25.7	1.39	14.2
Holdrege	63	-9	26.4	1.85	18.5
Hooper*[1]	58	-2	26.5	1.35	8.8
Imperial	63	-12	25.2	3.38	37.5
Kearney	64	-8	27.2	1.18	16.0
Kennedy	54[f]	-17[f]	21.4[f]	2.50	25.0
Kimball	67	-11	25.1	2.00	20.0
Kirkwood	56	-14	24.2	1.65	16.5
Leavitt	66	-8	28.4	1.20	...
Level	...	...	...	1.50	15.0
Lexington	62	-13	25.4	2.30	23.0
Loup	58	-7	24.0	0.60	10.0
Lynch	60	-12	26.2	1.70	17.0
McCook	...	...	...	2.85	28.5
McCool	...	...	...	1.63	...
Madison	57	-9	25.8	1.45	10.0
Marquette	...	...	...	1.65	13.0
Mason	...	...	...	1.10	...
Merriman	...	...	...	0.42	4.2
Minden	61	-9	26.2	1.80	19.5
Monroe	...	...	...	0.91	7.0
Nebraska City	56[h]	-9	27.2[d]	3.24	25.0
Nemaha	...	...	...	1.96	17.0
Norfolk	56	-9	25.5	1.08	10.0
North Loup	57	-12	24.6	0.69	6.8
Oakdale	53	-7	23.9	0.99	5.6
Oakland	56	-1	27.6	2.85	19.4
Odell	...	...	...	1.65	12.0
Ord	...	...	...	0.93	...
Palmer	...	...	...	2.00	8.0
Palmyra*[1]	68	-6	28.4	2.75	10.0
Pawnee City	67	-11	29.2	1.82	13.0
Plattsmouth	...	...	...	3.10	21.0
Plymouth	...	...	...	1.18	...
Purdum	58	-18	23.6	2.25	22.5
Ravenna	62	-10	25.5	1.52	12.5
Redcloud	74	-3	30.4	...	...
Republican	...	...	...	1.80	18.0
Rulo	...	...	...	1.85	16.0
St. Libory	...	...	...	1.64	14.0
St. Paul	60	-11	27.2	1.38	11.2
Santee	58	-5	26.8	1.29	9.2
Schuyler	...	...	...	1.72	11.0
Seward	65	-12	27.8	3.14	21.2
Smithfield	...	...	...	1.80	18.0
Springview	54	-14	22.5	1.95	19.0
Stanton	58	-10	27.4	2.25	8.5
Strang	...	...	...	3.00	22.0
Stratton	...	...	...	1.83	...
Superior	69	-6	26.6	1.87	14.5
Syracuse	...	...	...	2.88	23.0
Tablerock	...	...	...	1.99	19.0
Tecumseh	68	-15	29.3	2.05	25.0
Tekamah	64	-3	28.9	2.56	16.5
Turlington	65	-7	27.6	3.60	26.0
University Farm	66	-7	28.4	3.21	...
Wahoo	...	...	...	2.52	9.0
Wakefield	57	-4	30.8	0.97	6.3
Wauneta	...	...	...	3.50	35.0
Weeping Water	...	...	...	2.03	19.5
Whitman	...	...	...	2.25	12.5
Wilber	...	...	...	1.85	17.5
Wilsonville	...	...	...	2.10	21.0
Winnebago	63	-6	26.6	1.55	10.5
Wisner	...	...	...	2.82	12.2
Wymore	...	...	...	2.36	19.0
York	66	-11	26.3	2.05	18.8
Nevada.					
Amos	63	0	38.5	1.33	...
Battle Mountain	74	8	44.2	...	...
Beowawe*[1]	68	16	44.8	0.75	6.0
Carlin*[1]	65	16	39.5	0.90	4.0
Carson City	78	18	40.4	1.70	9.5
Columbia	67	13	40.4	0.80	2.0
Cranes Ranch	...	...	...	2.40	...
Dyer	71	4	42.2	0.50	...
Elko*[1]	65	0	35.3	1.17	4.2
Geyser	66	-12	34.4	3.84	19.0
Golconda*[1]	62	4	37.4	...	...

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Nevada—Cont'd.	°	°	°	Ins.	Ins.
Halleck	...	...	...	1.30	4.0
Hazen	70	8	42.3	0.27	T.
Humboldt	65	13	39.8	0.16	1.0
Lewers Ranch	69	14	40.6	4.43	19.5
Lovelocks	70	10	36.3	T.	T.
Martins	83	15	44.8	0.81	T.
Mill City*[1]	52	14	36.0	0.80	2.0
Morey	63	2	34.0	6.16	3.2
Palisade	74	4	37.7	1.19	3.5
Palmetto	68	7	36.7	5.19	7.0
Pioche	66	-5	33.4	2.92	4.0
Potts	59	-7	33.6	1.25	7.0
San Jacinto	58	-15	34.1	2.15	21.0
Tecoma	70	2	34.9	1.10	11.0
Verdi*[1]	73	13	44.3	...	...
Wabuska	70	10	40.7	T.	
Wadsworth	74	18	41.6	0.17	1.7
Wells*[1]	53	-4	33.8	3.54	34.0
Wood	59	-13	34.3	2.13	16.0
New Hampshire.					
Alstead	49	-1	24.2	3.65	25.0
Bartlett	...	...	...	4.08	25.0
Berlin Mills	53	-24	19.4	2.88	22.0
Bethlehem	53	-6	20.8	2.34	11.0
Brookline*[1]	56	-12	28.7	5.40	33.5
Durham	53	-2	26.0	4.35	28.0
Franklin Falls	54	-5	25.6	3.20	23.0
Grafton	52	-15	22.3	3.05	19.0
Hanover	56	-8	24.0	2.19	16.0
Keene	53	-10	26.3	3.46	19.7
Littleton	54	-5	20.6	2.07	9.5
Nashua	54	-4	28.8	5.29	29.5
Newton	53	-1	27.4	4.67	22.5
North Woodstock	...	...	...	3.69	...
Plymouth	54	-12	24.0	3.15	23.5
New Jersey.					
Asbury Park	56	15	35.4	5.17	14.4
Bayonne	55	11	34.1	5.18	12.2
Belvidere	56	3	32.8	5.32	13.5
Bergen Point	56	11	34.0	5.09	12.2
Beverly	57	13	36.0	5.59	14.0
Bridgeton	58	17	38.5	6.62	7.0
Canton	...	...	...	5.21	3.6
Cape May C. H	58	19	38.6	5.67	6.0
Charlotteburg	53	-7	29.7	4.11	15.0
Clayton	58	16	36.5	5.72	6.3
College Farm	57	7	33.6	4.28	6.0
Dover	52	5	29.6	4.73	16.0
Elizabeth	54	15	35.2	3.78	10.0
Englewood	54	10	33.6	5.19	14.0
Flemington	56	8	34.0	3.96	10.0
Friesburg	58	12	36.6	5.34	6.0
Imlaystown	62	13	38.4	5.25	7.2
Indian Mills	57	14	36.6	5.79	11.0
Jersey City	55	13	35.0	6.07	15.9
Lakewood	60	10	34.6	4.42	5.5
Lambertville	57	9	35.2	5.42	13.5
Layton	49	-15	27.6	4.41	16.0
Moorestown	58	13	35.4	5.37	6.8
Newark	55	9	33.3	4.98	13.5
New Brunswick	57	11	35.2	6.77	9.9
Newton	50	-5	29.9	5.18	17.2
Oceanic	62	16	35.4	4.92	9.0
Paterson	56	11	35.0	5.91	12.6
Phillipsburg	56	8	32.9	5.34	12.9
Plainfield	55	11	33.7	5.07	14.9
Rancocas	...	...	...	5.28	10.0
Rivervale	53	-2	32.2	...	20.0
Sandy Hook	58	14	33.8	4.60	13.5
Somerville	56	10	33.8	3.96	13.5
South Orange	60	12	33.4	3.70	10.5
Sussex	54	-7	30.4	4.87	22.7
Toms River	61	14[j]	35.0[e]	5.43	...
Trenton	58	12	37.4	4.42	7.0
Tuckerton	57	14	36.4	5.80	6.0
Vineland	58	16	36.7	5.95	7.5
Woodbine	57	16	37.8	5.75	3.0
New Mexico.					
Alamagordo	80[f]	20[f]	55.6[f]	0.26	
Albert	75	13	44.0	0.08	T.
Albuquerque	...	...	...	0.30	
Alma	75[e]	11[e]	48.6[e]	1.10	
Alto	...	...	...	0.92	4.2
Artesia	82	16	52.0	0.36	
Bellranch	80	10	44.7	T.	T.
Bloomfield	70	13	43.1	2.13	4.0
Cambray	...	...	...	0.60	
Carlsbad	...	...	...	0.20	
Chama	57	-8	32.8	4.00	49.0
Cimarron	71	4	38.4	0.41	3.0
Cliff	77	16	50.5	0.95	
Cloudcroft	57	8	35.9	1.47	5.8
Datil	68	9	41.0	0.54	2.5
Deming	80	15	51.0	0.56	
Dorsey	70	7	37.6	0.26	3.0
Eagle Rock Ranch	68	1	36.6	0.74	6.3
Elizabethtown	55	0	33.0	2.58	8.5
Elk	78	17	48.0	T.	T.

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
New Mexico—Cont'd.					
Engle	69[e]	23[e]	48.5[e]	0.00	
Espanola	67	15	44.4	0.37	
Estancia	70	12	43.1	0.69	
Fairview	74	12	46.1	0.00	
Fort Bayard	70	13	46.8	0.85	
Fort Stanton	71[d]	13[d]	43.8[d]	T.	
Fort Union	67	2	38.3	0.30	T.
Fort Wingate	64	12	41.0	4.80	7.0
Fruitland	74	13	44.2	1.91	1.5
Gallinas Spring	72	12	44.4	0.56	
Glen	80	11	48.4	0.00	
Gran Quivira				0.62	T.
Hillsboro	73	20	50.1	0.09	
Hope				T.	T.
Laguna	75	12	45.9	T.	
Lagunita	75	18	44.6	0.90	1.5
Lake Valley				0.41	T.
Las Vegas	69	9	40.6	0.47	2.0
Logan	77	10	43.4	0.20	
Lordsburg	87	22	55.2	0.07	
Los Alamos				0.62	
Los Lunas	72	23	50.1	0.25	
Luna	66	10	40.9	0.61	
Magdalena	72	16	44.4	0.24	T.
Manuelito				2.32	3.0
Maxwell				0.18	1.5
Mesilla Park	83	20	53.1	0.13	
Mineral Hill				1.39	5.5
Monument	80	17	50.8	0.00	
Mountainair	72	17	46.2[d]	0.28	T.
Nara Visa	74	12	44.0	0.05	T.
Patterson				T.	T.
Portales	78	14	46.8	0.77	3.2
Raton	75	2	42.2	0.40	4.2
Redrock				0.62	
Rincon	82	22	54.4	0.20	
Rosa				2.36	
San Marcial	80	19	52.8		
San Rafael	70	20	44.4	0.77	1.0
Socorro	76	18	45.5	0.17	
Springer				0.10	0.5
Strauss				T.	
Taos	67	11	40.1	1.66	3.0
Tres Piedras	60	−2	34.0	2.70	3.0
Tucumcari				0.05	
Valley				0.10	T.
Vermejo				1.64	20.0
Weed				0.00	
Whiteoaks				0.30	
Windsor	63[e]	1[e]	35.2[e]	3.60	
New York.					
Adams				3.63	23.0
Addison	53	−9	27.8	3.23	20.5
Akron				3.63	
Amsterdam	50	−6	24.7	3.81	17.0
Angelica	49	−14	25.7	3.08	26.0
Appleton	57	9	28.4	1.93	
Arcade	48	−15	23.7	5.00	27.0
Athens	48	−2	28.4	3.86	19.7
Atlanta	52	−5	25.4	2.58	12.1
Atwater				3.14	17.3
Auburn	52	4	27.7	3.59	18.5
Avon	52	−2	27.0	1.26	10.0
Baldwinsville	45	−4	28.5	3.78	16.0
Ballston Lake	45	−17	24.7	4.20	16.0
Bedford	52	4	31.1	4.53	16.2
Berlin	47	−10	25.5	3.51	22.5
Blue Mountain Lake				2.35	12.5
Bolivar	50	−17	26.3	3.31	22.0
Bouckville	45	−4	24.6	4.15	17.5
Brockport	54	5	28.2	3.12	17.5
Cape Vincent	42	−4	24.5	2.82	
Carmel	53	−2	28.8	6.85	16.5
Carvers Falls	57	−14	24.2	2.50	18.0
Chatham	52	−1	28.0	2.24	16.5
Chazy	50	−7	22.9	1.35	6.5
Coeymans	51	−5	27.8	2.61	12.6
Cold Spring Harbor	53	9	32.7	4.42	9.5
Cooperstown	52	−12	23.5	4.62	16.8
Cortland	49	0	27.0	2.98	17.9
Cutchogue	52	13	33.4	3.43	9.0
Dannemora	47	−4	21.8	1.70	7.2
Dekalb	54	−7	23.4	2.30	14.0
De Ruyter	46	−10	25.0	4.01	19.6
Easton				2.43	20.0
Elba	50	2	26.6	3.53	17.0
Elmira	68	0	30.3	2.70	13.5
Faust	49	−12	21.4	1.40	22.5
Fayetteville	54	−4	27.2	3.18	15.0
Fort Plain	50	−9	27.4	3.66	12.5
Franklinville	49	−16	25.2	3.30	20.5
Gabriels	49	−20	19.8	2.00	10.0
Gansevoort				4.97	20.5
Glens Falls	45	−5	25.4	3.83	12.5
Gloversville	44	−7	24.0	4.57	17.0
Greenfield	42	−5	24.7	4.50	19.0
Greenwich	49	−7	25.0	3.91	13.5
Griffin Corners	50	−10	24.1	4.31	21.5
New York—Cont'd.					
Harkness	49	−3	23.4	1.38	11.5
Haskinville				3.37	14.8
Hemlock	51	−3	27.2	2.25	
Hunt	55	−6	25.9	3.21	17.6
Indian Lake	54	−17	21.9	3.12	16.0
Ithaca	51	3	27.0	3.28	23.0
Jamestown	54	−6	25.2	2.98	26.0
Jeffersonville	51	−14	26.2	4.18	20.0
Keene Valley	54	−15	23.2	2.29	19.3
Lake George	47	−7	25.4	4.40	15.0
Le Roy	53	2	27.0	2.99	17.7
Liberty	49	−2	23.2	3.66	13.0
Littlefalls, City Res.	48	−3	24.2	3.83	23.0
Lockport	53	6	27.3	2.66	
Lowville	48	−13	23.0	2.82	19.0
Lyndonville				2.13	6.5
Lyons	53	2	28.4	4.20	18.0
Middletown	47	3	28.8	3.67	14.7
Mohonk Lake	49	5	26.6	3.28	16.0
Moira	54	−6	24.0	2.35	14.5
Mount Hope	52	5	32.2	3.45	15.5
Newark Valley				3.84	19.0
New Lisbon	49	−13	23.6	4.16	12.0
North Hammond	47[f]		26.4[f]	2.12	12.0
North Lake	46	−20	20.9	2.92	4.0
Ogdensburg	45	−10	25.4		
Oneonta	55	−5	28.2	2.90	19.0
Oriskany Falls	50	−1	25.8	3.08	10.0
Otto	48	1	26.5	2.34	
Oxford	49	−9	26.8	3.95	19.5
Oyster Bay	52	13	32.8	4.47	13.0
Palermo				2.31	25.6
Perry City	52	−8	25.4	4.19	19.4
Plattsburg	46	−6	23.7	2.25	9.0
Port Jervis	50	−6	29.4	4.09	17.0
Potsdam	50	−8	23.6	2.39	13.0
Richmondville[e]	49	−10	24.3		
Ridgeway	54	8	27.9	4.06	22.1
Romulus	52[c]	4[c]	27.6[c]	2.43	18.3
Salisbury Mills				4.29	18.0
Saranac	48	−15	21.4	1.92	12.4
Scarsdale	58	8	34.4	4.77	15.2
Setauket	55	15	33.5	5.03	11.4
Shortsville	55	4	26.4		
Skaneateles				3.60	
Southampton	52	9	33.4	5.81	8.5
South Canisteo	50	−12	25.8	3.17	17.7
South Schroon	47	−9	23.2	4.10	18.9
Taberg	47	−12	25.3	4.48	16.6
Ticonderoga	59	−17	25.4	2.63	15.0
Volusia	48	0	25.4	3.01	16.5
Wappinger Falls	50	−5	29.4	4.08	22.0
Warwick				3.34	22.0
Watertown	50	−8	25.8	3.47	12.5
Waverly	49	−12	27.2	3.60	20.2
Wedgwood	48	−4	25.5	3.67	21.0
Wells	48	−18	23.0	3.42	24.5
West Berne	57	−19	25.6	1.73	12.1
Westfield	51	0	26.8	3.12	21.7
Windham	54	−15	25.2	3.66	16.8
Youngstown				1.97	12.3
North Carolina.					
Battleboro				4.45	
Beaufort	69	32	51.6	5.34	
Brevard	73	13	44.2	8.90	T.
Brewers	70	16	42.4	6.01	2.0
Bryson City				4.97	T.
Buck Springs	67	6	38.8	11.22	0.2
Caroleen	77	18	46.4	6.22	T.
Catawba				6.22	
Chalybeate Springs	76	19	46.7	4.97	
Chapelhill	72	22	44.0	5.61	
Eagletown	70	23	46.5	5.65	T.
Edenton	67	25	47.4	5.50	
Fayetteville	80	24	49.8	3.90	
Greensboro	72	21	43.2	5.51	
Graham				5.04	T.
Greenville				7.17	
Henderson	67	23	42.8	4.20	1.5
Hendersonville	70	18	43.8	6.81	
Horse Cove	67	16	43.0	9.95	0.2
Hot Springs	70	20	48.4		
Kinston	80	22	50.4	7.53	
Lenoir[d]	73	16	44.2		
Lexington	75	12	42.8	5.49	T.
Lincolnton	70	19	46.2		
Linville	60	12	36.7	4.15	2.0
Louisburg	69	21	45.4	5.28	T.
Lumberton	79	26	49.6	6.61	T.
Manteo	66	30	49.2	6.21	
Marion	73	14	45.2	6.59	T.
Moncure	77	19	46.1	5.52	
Monroe	75	17	46.4	5.06	
Morganton	72	17	44.0	6.00	
Mountairy	64	16	40.6	4.28	3.0
Mount Holly				8.21	
Murphy				6.42	1.0
Nashville	70	21	46.2	5.13	
North Carolina—Cont'd.					
Newbern	78	23	50.6	7.68	
Patterson	68	18	40.8	5.02	T.
Pinehurst	78	24	51.9	4.97	
Pink Beds	65	5	38.9	11.34	
Pittsboro	75	18	45.5	5.22	
Randleman				5.49	
Reidsville	69	22	43.6	4.37	
Rockingham	79	22	49.8	5.49	
Salem	70	18	45.2	3.74	
Salisbury	76	19	43.6	5.62	
Sapphire	66	14	42.4	11.92	0.3
Saxon	68	19	42.6	3.58	2.0
Scotland Neck	72	25	48.0	5.27	
Selma	74	25	48.2	5.80	
Settle	77	18	46.2	5.61	T.
Sloan	80	21	51.7	7.94	
Snowhill	77	19	49.2	6.14	
Southern Pines	78	24	49.4	5.24	
Southport	73	28	52.5	5.03	
Statesville	75	16	45.2		T.
Tarboro	75	21	47.4	5.16	
Vade Mecum	68	16	43.6	4.25	2.0
Washington	76	24	51.2	6.09	T.
Wash Woods				6.32	
Waynesville	71	12	44.4	5.31	0.5
Weldon	71	19	44.2	4.36	T.
Whiteville	78	24	51.8	4.35	
North Dakota.					
Amenia	64	−15	20.3	0.43	4.0
Ashley	56	−27	15.4	1.10	11.0
Bottineau	57	−22	17.6	0.41	1.5
Buford	65	−27	21.0	0.20	2.0
Cando	56	−22	17.5	0.30	3.0
Chilcot	63	−31	20.0	0.20	2.0
Coalharbor	60	−26	17.4	0.50	5.0
Denbigh	55	−26	14.3		
Denhoff	57	−18	19.2	0.09	1.0
Dickinson	65	−29	20.0	0.98	8.0
Donnybrook	64	−23	18.6	0.05	0.5
Dunseith	54	−24	15.4	0.30	3.0
Edgeley	62	−25	18.5	0.16	1.6
Edmore	55	−22	15.5	T.	T.
Fargo	61			0.38	2.0
Forman	56	−19	21.6	0.40	4.0
Fort Berthold	63	−34	18.9	0.18	1.8
Fort Yates	65	−15	22.1	0.33	3.1
Fullerton	60	−27	19.6	0.89	8.6
Glenullin	62	−19	19.2	0.54	4.9
Grafton	58	−16	19.6	T.	T.
Hamilton	58[h]	−15[h]	19.6[h]	0.35	2.5
Hannah	56	−18	17.4	T.	T.
Hillsboro	58	−16	20.4	0.53	4.0
Jamestown				0.37	3.2
Kulm	59	−22	17.8	1.01	9.7
LaFollette	58	−30	16.9		
Langdon	56	−16	18.0		
Larimore	60	−18	18.4	0.11	T.
Lisbon	65	−20	21.2	0.75	7.5
McKinney	60	−31	17.4	T.	T.
Manfred	59	−28	18.4	0.53	5.3
Mayville	58	−9	21.1	0.11	0.5
Medina				0.36	3.2
Medora	67[d]	−25[b]	24.8[e]	0.55	5.5
Melville	60	−24	19.4	0.40	4.0
Milton	55	−20	17.7		
Minnewaukon	56[e]	−18[d]	19.6[d]	0.15	1.5
Minot	60	−30	16.1	0.15	1.5
Minto	65	−13	18.8	0.13	
Moyersville	55	−29	15.4	0.75	7.5
Napoleon	57	−25	15.0	0.60	6.0
New England	61	−25	22.4	0.20	2.0
Oakdale	64	−18	20.0	0.80	8.0
Oriska	61	−18	21.0	0.36	3.2
Palermo	57	−5	20.8	T.	T.
Pembina	60	−21	17.0	0.15	1.5
Portal	54	−22	12.2	0.20	2.0
Power[k]	63	−20	19.4		
Rolla	54	−20	15.0	0.70	6.4
Sentinel Butte	67	−22	21.5		
Steele	65	−26	17.2	0.40	4.0
University	58	−17	19.8	0.28	1.0
Wahpeton	60	−14	21.2	0.15	1.5
Walhalla	60	−22	18.0	T.	T.
Washburn	63	−30	19.2	0.20	2.0
Willow City	58	−26	15.8	0.20	2.0
Ohio.					
Akron	60	3	28.6	2.22	17.2
Amesville	68	6	36.7	3.94	
Atwater				3.25	16.0
Bangorville	59	1	29.6	3.79	20.0
Bellefontaine	53	−2	27.8	3.95	23.9
Benton Ridge	55	4	30.4	3.22	19.6
Bladensburg	62	−12	30.0	4.49	25.0
Bowling Green	54	0	29.0	1.92	12.0
Bucyrus	56	0	30.2	4.45	23.0
Cadiz	61	6	32.6	4.76	30.5
Cambridge	65	0	34.3	4.33	20.0
Camp Dennison	66	7	35.0	5.98	22.6

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
***Ohio*—Cont'd.**					
Canal Dover	59	—11	30.8	4.95	29.0
Canton	59	1	30.2	3.77	28.0
Cardington	57	—10	29.2	3.22	21.2
Chillicothe	70	13	36.9	4.86	20.2
Circleville	65	6	32.8	4.90	17.0
Clarington	68	9	36.4	4.72	15.5
Clarksville	63	6	33.2	5.18	11.3
Cleveland [b]	59	9	29.0	2.82	16.9
Coalton	68	0	36.4	4.04	14.8
Colebrook	53	— 3	26.9	2.88	17.0
Dayton	58	3	32.3	5.49	26.9
Defiance	57	8	30.2	2.32	15.3
Delaware	59	— 6	30.6	4.02	21.7
Demos	62	11	32.6	3.18	15.6
Findlay	56	5	29.3	2.78	16.5
Frankfort	64	7	34.7	5.45	12.0
Fremont	59	3	30.6	2.29	13.7
Garrettsville	60	— 8	29.7	3.06	15.5
Granville	62	— 3	31.8	5.24	30.0
Gratiot	63	— 2	31.3	4.06	25.6
Green	72	11	37.5	5.45	5.0
Greenhill	60	—11	29.0	3.18	23.4
Greenville	54	— 1	29.8	5.11	25.5
Hedges	56	— 4	28.7	2.45	11.1
Hillhouse	58	— 1	27.6	2.65	19.5
Hiram	58	2	28.9	3.21	21.0
Hudson	58	— 4	28.6	3.41	24.0
Ironton	74	13	39.6	6.21	6.0
Jacksonburg	59	6	31.4	5.74	30.5
Killbuck	61	— 1	30.5	4.32	3.02
Lancaster	62	5	33.6	5.07	11.0
Lima	55	5	31.0	3.88	23.0
McConnelsville	64	7	34.6	4.16	12.6
Manara	61	— 1	32.0	4.89	9.0
Mansfield	.....	.....	.....	4.48	18.3
Marietta	70	12	37.6	4.27	11.5
Marion	57	— 1	30.4	4.08	22.6
Medina	60	—10	28.8	2.97	17.0
Milfordton	60	— 9	28.8	4.25	25.5
Milligan	61	3	33.8	4.42	9.0
Millport	65	— 8	30.1	3.97	22.0
Montpelier	55	5	28.2	2.11	7.0
Napoleon	57	5	29.6	1.80	9.6
New Alexandria	62	4	33.1	2.30	.....
New Berlin	68	4	29.3	3.17	16.0
New Bremen	53	0	29.6	4.20	25.0
New Richmond	65	10	34.3	6.48	9.7
New Waterford	59	— 4	30.4	3.86	27.5
North Lewisburg	53	1	29.6	4.40	23.0
North Royalton	58	— 2	27.8	5.42	35.5
Norwalk	60	— 2	30.9	3.56	16.5
Oberlin	62	— 4	29.8	3.10	20.2
Ohio State University	59	0	31.0	5.44	29.0
Orangeville	51	—10	27.7	3.20	14.0
Ottawa	58	3	30.7	2.57	13.8
Pataskala	61	0	31.2	5.38	28.4
Philo	63	9	33.3		
Plattsburg	55	3	30.0	4.37	27.5
Portsmouth	71	13	36.4	6.95	6.9
Pulse	62	8	33.6	6.48	6.5
Rittman	60	— 8	29.6	3.27	11.5
Rockyridge	59	5	29.6	2.34	6.1
Shenandoah	59	— 1	27.3	2.65	11.9
Sidney	55	1	30.6	4.45	29.7
Somerset	62	9	33.2	3.28	18.7
South Lorain	54	2	28.6	3.48	18.7
Springfield	.....	.....	.....	4.52	.....
Summerfield	65	3	34.2	4.11	15.8
Thurman	67	10	37.0	3.88	8.0
Tiffin	55	7	29.8	3.41	21.0
Toledo (St. Johns College)	53	10	29.0	2.57	15.0
Upper Sandusky	56	2	29.8	4.41	26.0
Urbana	56	— 3	29.6	4.27	32.4
Vickery	58	0	29.1	2.00	13.2
Warren	60	— 5	30.2	3.19	22.6
Wauseon	58	2	28.4	2.43	13.3
Waverly	69	7	36.0	6.78	14.3
Waynesville	60	3	32.1	5.08	21.5
Wellington	59	— 1	30.2	3.00	18.5
Willoughby	.....	.....	.....	3.24	18.0
Wilson	70	3	35.7	6.69	10.0
Wooster	61	— 5	30.2	3.57	18.5
Zanesville	.....	.....	.....	4.26	17.0
Oklahoma.					
Alva	79	18	42.0	1.71	0.4
Arapaho	81	14	43.2	1.73	T.
Blackburn	72	16	39.7	2.57	
Cache	81	16	46.4	0.51	
Chandler	75	15	42.8	1.81	T.
Chattanooga	.....	.....	.....	0.08	
Enid	74	15	39.4	1.40	
Erick	82	13	43.3	0.81	T.
Fort Reno	76	18	41.8	2.85	
Fort Sill	80	18	46.4	1.50	
Gage	75	13	38.1	1.93	0.2
Guthrie	73	16	42.4	3.06	T.
Harrington	78	2	39.2	1.09	T.
Helena	74	14	38.2	1.00	T.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
***Oklahoma*—Cont'd.**					
Hennessey	75	17[f]	42.5[e]	2.89	T.
Hobart	81	15	44.8	0.46	
Jefferson	78	17	40.4	1.20	0.1
Jenkins	76	14	38.8	1.31	T.
Kenton	74	8	38.3	0.31	2.0
Kingfisher	75	18	42.0	3.10	T.
Luther	76	18	44.2	2.26	T.
McComb	70	18	43.2	0.25	
Mangum	80	19	43.8	0.80	
Meeker	73	12	41.4	1.10	
Newkirk	69[d]	15[e]	39.6[e]	1.49	T.
Norman	74	16	43.0	1.84	
Pawhuska	72	17	41.1	1.82	0.2
Perry	71	15	40.0	2.58	
Sac and Fox Agency	73	18	42.8	2.48	T.
Shawnee	73	18	42.2	1.62	
Stillwater	71	17	39.0	3.54	T.
Taloga	76	7	35.1	1.80	
Temple	81	18	49.6	1.79	
Watonga	74	15	40.4	2.72	T.
Waukomis	78	17	41.8	2.62	
Weatherford	.....	.....	.....	1.32	T.
Whiteagle	71	15	39.7	1.68	T.
Oregon.					
Alba	.....	.....	.....	1.52	
Albany	.....	.....	.....	2.62	2.0
Alpha	77	20	46.2	5.41	4.3
Ashland	73	18	44.4	3.65	14.3
Astoria	65	25	45.2	3.07	
Aurora (near)	69	23	44.9	1.83	.....
Bay City	65	23	45.1	5.09	
Bend	68	—13	32.6	1.25	13.0
Beulah	.....	.....	.....	1.60	16.0
Blackbutte	63	16	41.8	3.75	13.0
Blalock	72	14	45.3	0.99	T.
Bullrun	.....	.....	.....	4.22	0.5
Burns	54	—12	29.2	3.94	24.5
Carlton	68	22	45.3	2.60	1.0
Cascade Locks	68	13	43.7	2.71	
Corvallis	69	22	44.4	2.42	4.3
Dale	.....	.....	.....	1.77	6.3
Dayville	73	— 2	39.8	1.57	3.5
Doraville	67	16	42.4	2.60	4.5
Drain	76	18	47.4	3.39	3.5
Echo	77	8	42.6	0.83	1.0
Ella	70	7	40.9	0.94	1.5
Eugene	65	21	44.6	2.91	.....
Fairview	81	21	48.2	5.55	4.0
Falls City	67	21	41.8	4.33	3.8
Forestgrove	70	19	42.6	4.03	7.0
Gardiner	74	26	47.2	7.19	.....
Glendale	77	19	45.0	3.76	3.6
Glenora	73	16	41.7	3.02	2.5
Gold Beach	67	25	47.7	12.04	11.0
Government Camp	63	.....	.....	2.66	10.0
Granite	62	—23	32.2	3.24	19.4
Grants Pass	76	18	46.7	2.11	6.1
Grass Valley	70	— 4	35.8	1.65	4.0
Heisler	70	0	38.4	1.41	4.1
Heppner	74	3	39.7	1.92	0.7
Hood River	66	14	41.0	1.63	4.0
Huntington	65	5	35.6	4.40	28.0
Jacksonville	75	17	44.8	2.94	13.0
John Day	73[d]	— 5[d]	38.2[d]	1.07	6.0
Joseph	60	— 9	28.4	2.84	23.5
Kerby	78	11	44.1	5.78	24.0
Klamath Falls	62	0	35.0	1.03	5.0
Lagrande	61	— 2	35.0	1.88	4.0
Lakeview	.....	.....	.....	3.14	18.0
McKenzie Bridge	77	10	41.6	3.31	4.0
McMinnville	71	22	45.4	2.76	6.1
Marshfield	74	24	48.0	5.87	3.2
Meacham	.....	.....	.....	2.24	6.0
Mill City	70	14	43.4	3.18	T.
Mount Angel	71	21	45.6	2.29	0.5
Nehalem	.....	.....	.....	4.17	0.6
Newport	66	25	46.8	4.62	2.0
Odell	.....	.....	.....	1.91	.....
Olex (near)	68	4	38.6	9.39	4.4
Ontario	.....	.....	.....	2.00	12.0
Paisley	60	— 3	35.8	.....	.....
Pendleton	70	1	39.8	1.54	4.5
Port Oxford	64	30	47.9	8.82	6.0
Prineville	65	— 1	35.2	1.25	4.2
Prospect	75	6	39.4	3.96	13.0
Richland	65	— 9	35.1	2.03	14.0
Riley	.....	.....	.....	4.26	21.4
Riverside	65	—17	32.0	3.93	23.0
Salem	67	24	45.0	1.94	.....
Silverlake	67	—20	32.2	1.89	14.0
Sisters	76	—11	33.2	1.30	12.0
Sparta	54	— 5	29.6	3.37	24.0
Stafford	70	18	44.1	2.35	2.5
The Dalles	72	14	44.0	1.21	T.
Toledo	75	22	45.8	4.52	2.0
Umatilla	73	11	43.6	0.48	0.5
Vale	65	— 8	34.4	2.08	8.0
Van	.....	.....	.....	3.05	19.0

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
***Oregon*—Cont'd.**					
Wallowa	65	—14	29.9	0.98	6.5
Wamic	65	— 3	36.8	1.44	10.0
Warm Spring	70	8	39.5	2.21	6.3
Weston	70	— 3	37.2	4.10	11.5
Williams	77	11	44.2	3.65	16.0
Pennsylvania.					
Aleppo	65	0	34.2	3.89	13.0
Altoona	52	1	29.6	4.21	.....
Baldwin	57	— 1	29.6	3.22	13.4
Beaver Dam	.....	.....	.....	3.44	10.2
Bellefonte	56	0	32.6	4.24	24.0
Brookville	.....	.....	.....	3.20	18.4
Browers	.....	.....	.....	3.78	.....
California	65	11	36.4	4.05	16.8
Cassandra	52	0	29.1	4.40	35.0
Centerhall	54	— 5	27.4	4.39	27.2
Clarion	.....	.....	.....	3.04	18.2
Claysville	64	3	34.2	3.50	14.5
Clearfield	.....	.....	.....	4.35	21.9
Coatsville	59	15	35.1	5.26	13.7
Confluence	.....	.....	.....	4.81	16.0
Davis Island Dam	.....	.....	.....	3.90	19.4
Derry	68	4	33.8	3.79	18.0
Doylestown	.....	.....	.....	6.56	.....
East Mauch Chunk	52	1	31.2	6.38	17.0
Easton	55	9	33.4	4.34	12.8
Ellwood Junction	.....	.....	.....	3.18	19.5
Emporium	55	— 8	29.6	3.95	20.7
Ephrata	57	10	33.2	4.23	13.8
Everett	57	3	30.8	4.24	16.5
Forks of Neshaminy	.....	.....	.....	4.99	.....
Franklin	60	— 6	30.0	3.14	16.0
Freeport	60	1	33.2	3.88	16.7
Gettysburg	55	10	33.8	4.61	22.0
Girardville	.....	.....	.....	7.22	30.0
Gordon	54	— 6	29.7	7.37	26.0
Greensboro	.....	.....	.....	4.24	10.0
Greenville	59	— 5	30.2	3.51	23.2
Hamburg	56	9	33.6	5.89	14.0
Hanover	61	14	36.1	4.23	16.0
Herrs Island Dam	.....	.....	.....	3.60	16.0
Huntingdon	60	2	32.2	4.24	18.0
Hyndman	.....	.....	.....	4.21	24.3
Indiana	61	2	30.8	3.59	21.6
Irwin	62	6	36.2	3.87	15.1
Johnstown	64	5	33.6	5.29	20.0
Kennett	61	14	35.6	.....	.....
Lansdale	.....	.....	.....	3.72	.....
Lawrenceville	52	—11	27.4	4.33	23.0
Lebanon	58	10	33.8	5.41	16.5
Leroy	48	— 2	26.2	4.26	25.0
Lewisburg	52	—13	30.7	5.64	31.0
Lockhaven	51	1	31.6	4.39	25.5
Lock No. 4	.....	.....	.....	3.44	7.6
Lycippus	63	7	32.8	4.00	21.1
Marion	53	3	32.9	4.93	29.0
Mifflintown	51	— 1	31.8	4.09	17.2
Milford	49	— 8	28.4	5.45	24.6
Montrose	48	— 1	27.0	5.00	35.5
New Germantown	56	4	32.0	3.73	19.0
Ottsville	.....	.....	.....	5.02	.....
Parker	.....	.....	.....	3.00	.....
Penmar	.....	.....	.....	4.79	.....
Philadelphia	57	16	37.4	6.29	8.7
Pocono Lake	48	—10	27.3	5.43	24.0
Point Pleasant	.....	.....	.....	5.23	.....
Pottsville	.....	.....	.....	5.89	.....
Reading	59	12	35.1	4.01	13.8
Renovo	.....	.....	.....	3.90	22.0
Saegerstown	57	—13	29.6	3.57	19.0
St. Marys	51	— 3	26.9	5.26	29.0
Saltsburg	.....	.....	.....	2.96	17.5
Seisholtzville	.....	.....	.....	5.08	.....
Selinsgrove	51	— 3	31.6	4.57	24.0
Shawmont	.....	.....	.....	4.92	.....
Skidmore	60	— 9	29.8	3.06	24.5
Smiths Corners	.....	.....	.....	3.78	.....
Somerset	57	5	29.2	7.35	40.4
South Eaton	50	— 4	30.0	5.71	29.0
Springdale	.....	.....	.....	3.47	18.1
Springmount	.....	.....	.....	4.30	.....
State College	53	1	29.2	3.77	21.0
Swarthmore	56	14	35.2	4.30	7.0
Towanda	53	— 8	27.8	4.26	24.6
Uniontown	65	11	35.4	5.15	24.0
Warren	56	—10	29.1	4.63	22.8
Wellsboro	50	—12	26.6	.....	.....
Westchester	58	13	34.6	5.61	11.2
West Newton	.....	.....	.....	3.33	15.0
Wilkesbarre	53	3	32.0	4.50	21.0
Williamsport	49	3	31.0	4.49	22.5
Rhode Island.					
Bristol	50	10	33.1	6.13	10.5
Kingston	53	5	31.2	6.34	11.0
Pawtucket	63	15	36.4	4.96	11.2
Providence	57	9	33.6	5.42	13.5
South Carolina.					
Aiken	80	24	53.4	4.40	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
South Carolina—Cont'd.	°	°	°	*Ins.*	*Ins.*
Allendale	79	29	56.8	3.65	
Anderson	75	24	48.6	7.81	
Batesburg	78	22	50.1	6.78	
Beaufort	78	33	57.0	3.37	
Bennettsville	79	26	51.2	4.21	
Blackville	82	28	54.4	4.08	
Blair				4.52	
Bowman	79	28	54.8	3.77	
Calhoun Falls				8.93	
Camden				5.87	
Chappells				6.82	
Cheraw	78	24	49.0	5.04	
Clarks Hill	78	23	51.2	3.78	
Clemson College	75	23	50.6	8.02	
Conway	81	28	53.4	4.31	
Darlington	79	24	51.0	5.32	
Dillon	80	24[e]	52.0[e]	4.98	
Due West	79	24	50.0	7.21	
Edisto				3.89	
Effingham				7.25	
Enoree				7.15	
Florence	80	27	51.8	5.13	
Gaffney	76	22	46.2	7.29	
Georgetown	74	31	53.6	3.51	
Greenville	73	18	44.4	7.68	
Greenwood	73	23	47.8	5.89	
Heath Springs	78	23	49.6	5.19	
Kingstree	79	36	57.3	4.85	
Liberty	75	22	46.8	8.29	
Little Mountain	77	26	50.7	6.57	T.
Newberry	77	25	50.6	5.35	
Pelzer				7.58	
St. Matthews	77	27	52.2	3.26	
St. Stephens				4.64	
Saluda	77	25	51.2	5.72	
Santuck	76	22	48.0	5.90	
Seivern	80	19	51.0	5.47	
Smiths Mills				3.98	
Societyhill	74	27	50.2	5.23	
Spartanburg	77	19	46.6	6.32	
Statesburg	79	27	53.7	5.29	
Summerville	82	27	56.4	3.73	
Sumter	81	25	54.3	5.27	
Trenton	76	25	51.4	5.52	
Trial	79	27	55.2	3.80	
Walhalla	74[e]	19[e]	48.0[e]	10.25	
Walterboro	82	27	56.2	3.89	
Winnsboro	77	23	49.4	4.99	
Winthrop College	75	22	48.6	6.15	
Yemassee	80	27	53.8	4.17	
Yorkville	79	24	49.0	5.97	
South Dakota.					
Aberdeen	67	−2	22.9	1.39	13.5
Academy	53	−10	22.2	3.00	30.0
Alexandria	59	−12	22.2	2.26	18.5
Armour	54	−11	22.6	1.51	12.6
Ashcroft	60	−20	22.4	1.30	13.0
Bowdle	61[e]	−20[e]	20.8[e]	0.40	4.0
Brookings	55	−12	21.2	0.58	8.4
Canton	53	−8	24.2	0.78	13.0
Castlewood	54	−13	20.7	0.36	3.7
Centerville	55	−7	24.6	1.94	19.2
Chamberlain	57	−13	23.8	1.49	20.0
Cherry Creek	71	−26	24.0	0.40	4.0
Clark	56	−16	20.4	1.20	12.0
Clear Lake	50	−14	19.0	0.95	9.5
Desmet	56	−12	21.8	0.78	7.8
Doland	55	−17	21.4	0.83	10.0
Elkpoint	59	−7	26.0	2.08	12.5
Fairfax	55	−15	21.8		
Farmingdale				0.75	8.3
Faulkton	59	−21	21.2	0.96	11.0
Flandreau	54	−7	21.0	1.37	13.4
Forestburg	56	−16	19.6	2.00	20.0
Fort Meade	60	−12	23.4	2.25	22.5
Gannvalley	56	−15	22.6	1.45	19.0
Grand River School	65	−27	21.6	0.95	9.5
Greenwood	57	−6	26.0	0.99	9.5
Hermosa	70	−19	24.2	0.59	7.0
Highmore	57	−19	22.0	0.80	8.0
Hotch City	62	−19	23.1	0.59	10.5
Howell	59	−19	21.1	0.54	6.3
Howard	54	−10	23.0	0.85	7.3
Ipswich	60	−20	19.9	0.64	5.0
Kidder	64	−23	19.2[e]	0.50	5.0
Kimball	50	−13	22.3	1.45	14.5
Leola	52	−23	20.4	0.36	8.0
Mellette	63	−21	20.8		
Menno	53	−9	24.0	1.77	13.0
Milbank	59	−14	19.8	1.89	18.5
Mitchell	56	−11	22.6	3.45	28.2
Mound City	60	−21	18.5	0.20	2.0
Oelrichs	75	−20	23.0	1.00	10.0
Pine Ridge	69	−22	24.1	0.97	11.0
Ramsey	51	−18	21.6	2.13	14.0
Redfield	59	−19	19.3	0.60	11.8
Rosebud Agency	58	−11	24.8	0.90	9.2
Sioux Falls	55	−9	23.8	1.37	9.0

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
South Dakota—Cont'd.	°	°	°	*Ins.*	*Ins.*
Spearfish	53	−12	25.5	0.56	
Stephan	58	−18	21.8	1.20	11.0
Tyndall	54	−9	25.0	1.90	
Vermillion	55	−5	25.7		
Watertown	52	−14	29.7	0.78	11.2
Wentworth	54	−11	21.4	1.42	12.7
Woolsey				2.82	14.6
Tennessee.					
Andersonville				6.65	
Ashwood	70	23	43.2	6.53	
Benton	76	19	46.4	5.59	T.
Bluff City				3.14	
Bolivar	72	21	43.1	5.72	
Bristol	68	17	42.8	3.24	T.
Brownsville	69	25	42.6	4.49	
Byrdstown	69	20	43.2	6.36	0.3
Carthage	71	23	44.9	4.78	
Catlettsburg				4.22	
Cedar Hill	71	21	41.8	6.45	T.
Celina				6.12	
Charleston				5.60	
Clarksville	70	23	42.0	6.96	0.2
Clinton				4.45	T.
Covington	70	23	43.4	5.61	
Dandridge				4.15	T.
Decatur	73	17	46.0	6.59	T.
Dickson	71	20	42.4	7.02	T.
Dover	75	22	42.8	6.68	T.
Dyersburg	71	23	41.1	8.08	
Elizabethton	71	18	42.8	2.46	T.
Erasmus	71	12	41.8	6.28	0.3
Florence	69	24	44.4	5.93	T.
Franklin	69	25	43.8	5.94	
Greeneville	68	18	44.8	3.66	0.2
Halls Hill				6.61	T.
Hohenwald	71	13	42.2	6.44	
Iron City	71	19	46.7	6.28	
Jackson	72	26	46.2	5.56	
Johnsonville	72	23	44.1	4.56	T.
Jonesboro	68	18	45.0	2.74	
Kenton	72	23	42.6	7.53	T.
Kingston				5.43	0.5
Lafayette	69	21	42.2	7.50	T.
Leadvale				3.56	
Lewisburg	72	23	46.0	7.26	T
Loudon				4.75	T.
Lynnville	69	24	44.4	7.90	T.
McGee				4.25	0.5
McMinnville	76	20	45.4	5.31	0.4
Maryville	75	21	46.2	4.35	0.2
Milan	70	24	41.0	5.58	T.
Monterey	70	17	42.8	4.25	T.
Newport	70	20	45.6	3.95	T.
Palmetto	71	23	45.8	6.11	T.
Pope	72	20	45.6	5.14	
Rogersville	69	17	45.2	3.69	T.
Rugby	70	12	41.6	6.73	0.5
Savannah	72	24	46.0	5.38	
Sevierville	75	20	46.8	3.69	T.
Sewanee	66	19	43.6	3.66	
Silver Lake	63	15	40.7	3.96	3.0
Sparta	73	24	46.6	4.68	
Springdale	72	12	44.1	3.80	0.5
Springville	72	24	43.1	6.48	T.
Tazewell				3.93	1.5
Tellico Plains	70	19	47.2	4.76	T.
Tracy City	67	16	42.9	5.47	
Trenton	71	23	43.2	5.81	T.
Tullahoma	73	21	45.9	5.03	T.
Union City	75	22	42.4	6.77	
Walling				4.79	
Waynesboro	72	22	45.4	6.29	T.
Wildersville	69	25	44.6	3.62	
Yukon	70	23	46.2	7.03	
Texas.					
Albany	87	17	49.0	1.55	
Alvin				1.53	
Arthur				4.20	
Austin	85	32	56.8	2.47	
Ballinger	90	21	54.2	1.09	
Beaumont	87	25	59.2	2.30	
Beeville	92	33	61.6	2.72	
Big Spring	85	21	53.1	0.87	
Blanco	89	24	51.3	1.13	
Boerne	89	22	53.7	0.45	
Bonham	82	25	49.6	3.81	
Booth				1.56	
Bowie	80	20	49.9	1.17	
Brenham	84	29	57.2	1.18	
Brighton	80	37	62.6	2.65	
Brownwood	88	20	53.4	0.90	
Channing	75	12	44.4	0.18	
Childress	81	13	46.4	T.	
Clarksville	81	24	49.0	5.08	
Claytonville	80	15	50.6	0.75	
Coleman	84	22	54.8	1.46	
College	85	29	59.6	1.09	
Colorado	87	16	53.0	1.43	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Texas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Columbia	81	32	60.9	1.55	
Columbus				1.35	
Corsicana	79	27	49.9	2.10	
Cotulla	77	32	61.0	0.37	
Crockett	85	27	56.0	1.05	
Cuero	83	30	57.2	1.79	
Dallas	91	25	50.8	3.22	
Dalhart	79	10	42.6	0.05	0.5
Danevang	82	29	59.9	1.45	
Dialville	80	26	53.0	2.67	
Denison				4.03	
Duval	87	27	56.2	1.40	
Eagle Pass	97	32	63.0	0.45	
Fort Brown	91	40	67.2	0.10	
Fort Clark	91	28	60.6	0.30	
Fort Davis	80	20	52.8	0.04	T.
Fort McIntosh	94	42	68.1	0.38	
Fort Stockton	86	21	54.0	T.	
Fredericksburg[e]	88	22	54.4		
Gainesville	81[d]	21[e]	49.3[d]	2.36	
Georgetown	90	26	56.0	1.91	
Gonzales				1.77	
Graham	85	18	52.1	1.59	
Grapevine	89	23	52.5	1.90	
Greenville	75	25	48.8	2.84	
Hale Center	73	17	39.0	0.30	2.0
Hallettsville	85	31	60.2	1.26	
Haskell	88	18	50.2	0.60	
Hearne	89	26	55.4	1.97	
Hempstead				1.23	
Henrietta	83	20	47.7	0.33	
Herford	75	12	44.8	1.30	
Hewitt				2.07	
Hillsboro	90	22	53.6	2.73	
Hondo	93	27	60.2	1.00	
Huntsville				0.69	
Jefferson	79	27	53.0	4.92	
Jewett	86	27	55.1	1.60	
Junction				0.56	
Kaufman	86	26	53.2	3.97	
Kent	82	21	52.9	0.00	
Kerrville	80	28	53.6	1.52	
Knickerbocker	88	16	54.7	0.89	
Kopperl				1.55	
Lampasas	90	20	52.0	1.20	
Liberty	84	31	58.4	1.85	
Llano	90	24	55.2	0.07	
Longlake				1.43	
Longview	80	27	51.6	7.91	
Luling	90	27	57.7	1.87	
Mann	90	24	54.7	1.96	
Marlin	86	25	55.3	2.53	
Menardville				0.59	
Mexia	86	26	52.2	1.71	
Miami	78	11	40.8	1.00	
Mount Blanco	81	17	45.4	0.51	T.
Mount Pleasant	82	26	51.5	3.73	
Nacogdoches	80	27	54.3	1.63	
Nazareth				0.73	T.
New Braunfels	90	30	57.9	1.70	
Panter				1.38	
Paris	83	24	48.8	2.25	
Port Lavaca	79	34	61.2	2.15	
Quanah	86	18	48.8	T.	T.
Rhineland	84	16	47.2	1.65	
Riverside				0.71	
Rockisland	82	30	59.2	1.73	
Rockland				4.05	
Rockport	78	38	60.4	2.00	
Runge				2.52	
Sabinal				0.76	
San Marcos	89	29	56.2	2.20	
San Saba	88	18	54.6	1.22	
Seymour	83	18	47.6	1.24	
Sherman	81	27	54.9	3.89	
Sonora	85	20	53.5	0.42	
Sugarland	83	29	59.8	1.30	
Sulphur Springs	81	26	51.3	4.77	
Temple	88	22	52.8	1.41	
Texline	73	7	41.0	0.65	6.5
Valley Junction				1.79	
Victoria	84	31	61.0	2.24	
Waxahachie	91	24	51.1	2.84	
Weatherford	85	21	49.2	2.13	
Willspoint	84	25	51.3	3.68	
Utah.					
Alpine				4.19	2.0
Aneth	73	19	47.4	1.06	
Beaver	70	9	36.6	3.59	
Castledale[g]	64	5	34.3		
Castle Rock				2.04	29.0
Cedar City	64	10	39.8	3.78	19.0
Corinne	64	12	39.1	3.32	5.0
Cottonwood Creek Cabin	56	−12	29.3	7.10	71.0
Coyoto	62	−2	35.4	1.38	
Deseret	68	1	38.8	2.10	14.0
Emery	58	5	36.8	1.30	13.0
Experiment Farm	75	21	48.9		

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Utah—Cont'd.	°	°	°	*Ins.*	*Ins.*
Fillmore	68	5	41.2	3.88	
Fort Duchesne	67	4	36.0	1.10	7.0
Garrison	66	5	37.9	2.47	
Giles	70	19	47.4	1.03	
Government Creek	60	1	35.8	2.67	12.5
Grayson	86	16	42.2	3.72	7.0
Heber	60	−6	33.6	3.93	
Henefer	60	−11	33.2	3.73	25.5
Hite	77	25	50.0	1.42	
Huntsville				3.31	15.5
Ibapah	62	−6	35.0	1.75	10.0
Indianola				3.20	
Kanab	67[g]	9	37.7[d]	8.50	
Kelton	70	20	42.0	1.56	5.0
Levan	64	5	35.8	5.69	36.2
Lucin	60	1	41.0	0.15	1.5
Manti	62	2	35.8	2.82	
Marion				4.69	24.0
Marysvale	64	−5	36.2	3.02	22.3
Meadowville	50	−22	24.4	3.40	27.0
Millville				2.54	
Moab	75	14	46.6	1.88	8.0
Morgan	62	−8	34.2	2.95	20.1
Mount Nebo	66	13	39.3	2.86	12.0
Nephi				4.29	18.0
Oak City	65	3	39.2	3.49	25.0
Ogden	64	8	37.8	3.05	23.0
Panquitch				2.93	16.0
Parowan	65	7	38.4	3.99	25.0
Payson				5.11	34.0
Pinto	61	−4	35.3	6.45	18.0
Plateau	54	1	31.7	4.04	35.5
Provo	69	12	41.2	2.80	20.0
Ranch	62	−9	32.2	12.02	
Randolph				1.20	14.0
Richfield	64	−1	38.2	1.51	15.0
Rockville	77	22	52.6	5.13	
St. George	79	22	50.2	2.51	
Salt Air	60	11	37.8	3.45	26.0
Scipio	63	−4	36.8	3.97	23.0
Snowville	60	−2	33.4	4.03	
Soldier Summit	48	−15	27.2	0.64	14.0
Sunnyside				2.25	19.5
Thistle	70	6	36.5	4.77	29.0
Tooele	67	7	38.9	3.26	
Tropic	65	12	38.4	4.87	30.0
Trout Creek	65	3	36.4	0.92	
Vernal	65	4	32.8	1.11	6.3
Wellington	64[f]	14[e]	38.8[f]	0.90	5.0
Vermont.					
Burlington	47	0	26.4	1.75	8.5
Cavendish[d]	52	0	24.2		
Chelsea	48	−4	20.1	3.30	26.0
Cornwall	48	−1	26.2	1.82	10.0
Enosburg Falls	51	−9	22.4	1.99	5.2
Jacksonville	53	−16	22.7	4.49	24.0
Manchester	47	−5	23.8	2.82	11.0
Norwich	48	−10	22.4	3.46	17.5
St. Johnsbury	52	−12	23.4	1.82	7.2
Wells	46	−4	23.0	3.21	14.0
Westfield				2.78	11.0
Woodstock	50	−16	25.6	2.93	27.5
Virginia.					
Alexandria	61	16	39.9		
Arvonia	65	10	41.0	5.52	7.5
Ashland	65	18	40.6	5.64	6.5
Barboursville	61	18	40.4	5.78	7.0
Bigstone Gap	71	17	43.9	4.36	5.0
Blacksburg	65	12	36.8	3.77	6.0
Buchanan				4.21	7.0
Burkes Garden	62	11	36.2	3.96	6.0
Callaville	68	19	43.6	4.90	1.0
Charlottesville	61	18	39.0	4.66	5.0
Clarksville				4.03	
Columbia	65	15	40.4	6.34	7.0
Dale Enterprise	67	8	35.7	4.27	13.0
Danville				4.19	3.8
Dinwiddie	68	11	42.1	6.35	7.0
Doswell	63	11	41.6	6.29	8.0
Elk Knob	66	19	41.4	4.03	T.
Farmville	65	20	39.4		3.0
Fredericksburg	64	11	39.4	5.44	8.5
Glasgow				4.43	4.5
Grahams Forge	68[d]	11[d]	37.8[d]	4.25	7.0
Hampton	64	26	44.7	4.62	5.0
Hot Springs	62	11	35.7	4.60	6.0
Ivanhoe				5.72	9.2
Lexington	67	13	39.1	4.46	9.3
Lincoln	66	11	35.7	5.40	11.0
Marion	65	16	40.4	3.14	2.0
Mendota				2.99	0.3
Newport News	64	23	43.8	4.94	6.2
Nokesville (near)	63	14	36.6	4.10	6.0
Petersburg	68	10	39.4	5.44	5.0
Quantico	60	10	39.4	4.85	5.0
Radford				4.30	4.0
Randolph				3.71	
Riverton				2.49	9.0
Virginia—Cont'd.	°	°	°	*Ins.*	*Ins.*
Roanoke	66	20	42.4	4.34	5.2
Rockymount	65	15	41.7	4.27	5.0
Shenandoah				3.69	5.7
Skyland				3.78	16.5
Speers Ferry				4.86	1.0
Spottsville	65	14	44.0	5.43	4.4
Staunton	65	18	39.3	4.29	5.9
Stephens City	67	14	35.8	5.01	13.0
Warsaw	68	11	39.4	6.35	6.5
Williamsburg	65	12	42.3	7.00	7.0
Woodstock	68	8	35.8	4.81	13.0
Washington.					
Aberdeen	69	18	45.2	5.16	
Anacortes	59[c]	21[c]	44.0[c]	0.69	
Ashford				2.37	
Baker	74	15	45.4	1.43	
Bellingham	70	15	45.4	1.10	
Blaine	62	18	43.6	1.76	
Brinnon	65	20	42.5	4.33	
Cedonia	64	7	36.2	0.66	0.5
Centralia	70	14	43.3	2.61	2.0
Cheney	63	5	34.6	1.01	5.1
Clearbrook	69	10	43.6	1.57	
Clearwater	64	18	42.5	8.00	1.0
Cle Elum	68	0	35.4	0.96	
Colville	63	0	34.8	0.02	
Conconully	59	1	34.8	2.08	2.0
Coupeville	64	21	45.4	1.10	
Crescent	62	0	34.9	0.49	0.8
Cusick	65	0	33.6	0.20	
Danville	64	1	35.4	0.98	0.9
Dayton	70	2	40.5	1.70	4.0
Easton				1.08	7.0
East Sound	64	15	42.8	1.22	
Ellensburg	67	2	37.6	1.02	
Ephrata	69	10	41.0	1.07	T.
Fort Simcoe	66	11	40.7	1.39	1.5
Goldendale	68	5	38.8	1.70	T.
Grandmound	70	11	42.5	2.48	1.0
Granite Falls				2.62	
Hatton	73	6	41.6	0.64	
Ilwaco	71	22	46.2	5.22	T.
Kennewick	85	10	43.2	0.37	T.
Kiona	71	12	42.4	0.37	T.
Kosmos	80	16	45.1	1.42	
Lacenter	69	20	42.8	2.94	1.5
Lakeside	63	13	39.6	1.02	
Lester	68	10	40.2	1.48	T.
Lind	67	5	38.8	0.66	2.0
Loomis	65	9	39.0	1.41	
Lucerne	60	12	38.6		
Mazama				0.16	
Merritt				0.95	0.7
Mottinger Ranch	76	12	45.4	0.75	0.5
Mount Pleasant	70	19	43.0	2.22	T.
Moxee	68	4	39.8	1.23	T.
Northport	64	0	32.4	1.17	1.9
Odessa	69	6	40.0	0.83	T.
Olga	60	25	44.9	1.05	
Olympia	70	12	44.0	1.41	T.
Pinehill	77	12	42.3	2.07	3.2
Pomeroy[1]	66	−4	37.2		
Port Townsend	60	24	45.2	1.48	
Pullman	63	−10	38.7	1.37	3.5
Quiniault	66	8	43.6		
Rattlesnake	57[h]	4[h]	32.6[h]	1.15	3.8
Republic	63	−3	32.8	0.92	5.0
Ritzville				0.43	T.
Rock Lake				1.05	2.5
Rosalia	63	6	36.8	1.13	0.5
Sedro	66	17	45.1	1.28	
Snohomish	70	16	45.0	2.78	
Snoqualmie	66	16	44.0	2.15	
Southbend	71	18	44.7	3.62	
Stehekin	62	8	36.4	1.93	
Sunnyside	67	8	40.6	0.86	
Tekoa				1.69	
Touchet	74	5	41.8	0.67	2.0
Trinidad	68	10	42.2	0.30	T.
Twisp	66	1	35.8	0.49	T.
Union	70	16	43.6	4.20	T.
Vancouver	73	18	44.8	2.47	2.5
Vashon	72	21	44.2		
Wahluke	72	12	43.2	0.53	0.5
Waterville	58	1	31.0	0.90	3.0
Wenatchee (near)	59	7	36.4	0.86	T.
Wilbur	63	3	36.7	0.95	0.2
Winthrop	61	−1	33.2	0.82	0.5
Yale	75	20	45.3		
Zindel	71	10	42.0	1.26	3.0
West Virginia.					
Bancroft	75	3	39.8	4.33	4.0
Bayard	59	−3	31.2	6.95	22.5
Beckley	72	8	37.2	4.01	
Bens Run	72	12	37.2	5.06	24.0
Berkley Springs	61	11	36.8	5.01	26.5
Bluefield	65	15	39.8	3.70	
Buckhannon	69	5	37.2	8.11	14.8
West Virginia—Cont'd.	°	°	°	*Ins.*	*Ins.*
Burlington	65	4	35.2	5.55	23.0
Cairo	72	9	38.4	6.91	10.0
Central	72	8	35.7	3.98	14.0
Charleston	72	18	42.5	5.37	1.0
Creston	70	8	37.8	4.93	6.5
Cuba	73	−7	37.4	3.18	5.0
Doane	74	15	41.2	6.45	
Elkhorn	67	12	41.4	2.90	2.0
Fairmont	70	8	37.8	4.16	18.3
Franklin	67	6	36.3	3.87	5.5
Glenville	74	9	39.2	5.81	9.0
Grafton	70	9	37.6	5.57	16.5
Green Sulphur Springs	68	12	37.8	4.52	7.0
Harpers Ferry				3.27	10.3
Hinton	67[j]	12[j]	41.6[j]	3.98	6.5
Huntington	72	15	37.5	5.36	4.8
Leonard	57	10	33.6	5.02	16.0
Lewisburg	64	14	37.8	4.70	10.0
Logan	74	20	45.0	6.56	12.0
Lost City	56	9	35.0	2.08	10.0
Lost Creek	74	11	38.4	5.51	16.5
Madison	74	2	38.3	4.90	9.7
Martinsburg	62	15	34.0	4.25	14.0
Moorefield	65	4	36.0	4.30	22.0
Mooresville				4.50	14.5
Morgantown	69	11	36.7	3.73	10.0
Moundsville	67	8	36.5	5.63	13.9
New Cumberland	60	4	32.3	3.04	15.8
New Martinsville	72	12	38.6	4.43	8.0
Oceana	77	16	44.3	2.90	T.
Parsons	67	−2	35.8	6.16	12.5
Philippi	71	5	37.6	5.09	21.2
Pickens	63	5	33.2	6.96	26.0
Point Pleasant	74	16	40.0	4.82	4.0
Powellton	69	16	42.4	4.64	7.0
Princeton	59	9	34.1	4.60	14.0
Romney	65	12	38.6	4.19	13.5
Rowlesburg				5.56	17.5
Ryan	71	8	38.6	4.94	8.5
Smithfield	71	9	35.9	4.93	15.2
Southside	72	10	38.1	4.58	6.5
Spencer	71	6	36.0	5.01	23.5
Sutton	74	10	38.2	6.52	24.0
Terra Alta	50	−1	29.0	5.42	32.4
Union	70	21	43.0	2.77	2.5
Uppertract	64	4	36.4	3.45	10.8
Webster Springs	69	12	38.6	6.20	29.0
Wellsburg	59	6	32.2	3.27	18.7
Weston				6.54	20.2
Wheeling	70	15	41.1	4.30	
Williamson	69	19	38.9	4.86	1.0
Wisconsin.					
Amherst	47	−8	21.2	2.68	7.3
Antigo	47	−16	19.4		
Appleton	49	−2	23.6	1.86	5.0
Appleton Marsh	49	−7	22.3	2.98	4.5
Ashland	50	−11	20.7	0.90	7.0
Barron	52	−12	21.0	1.00	10.0
Beloit	48	4	26.2	1.47	6.0
Berlin	48	−4	22.8	2.00	
Black River Falls				2.42	7.0
Brodhead	49	1	27.6	2.35	5.5
Burnett	47	0	24.4	1.98	3.5
Butternut	51	−27	16.8	1.92	16.7
Chilton	46	−2	26.1	2.83	5.9
Chippewa Falls				2.83	6.0
Dunning	48	−12	20.9	1.20	
Eau Claire	46	−5	22.8	3.07	5.8
Florence	41	−19	16.1	2.59	16.0
Fond du Lac	46	−3	24.2	1.82	6.0
Grand Rapids	49	−7	21.9	2.79	
Grand River Locks				2.59	4.0
Grantsburg	50	−14	20.3	1.10	9.0
Hancock	45	−4	22.0	3.85	2.0
Harvey	47	2	26.1	1.85	4.0
Hayward	48	−29	15.8	2.19	19.0
Hillsboro	50	−6	24.6	3.35	5.5
Koepenick	52	−27	18.4	2.80	18.0
Lancaster	50	0	25.1	0.92	6.0
Manitowoc	47	0	25.6	2.37	5.0
Mauston	50	0	24.0	3.15	5.0
Meadow Valley	47	−8	21.0	1.90	2.5
Medford	50	−15	21.1		
Menasha				2.67	3.5
Merrill	52	−20	19.0	2.60	7.0
Minocqua	44	−32	12.0	2.10	13.0
Mount Horeb	50	0	25.1	2.60	6.5
Neillsville	50	−10	21.3		
New London	46	−3	22.4	3.60	T.
New Richmond	49	−7	23.4	0.48	4.8
Oconto	46	−9	22.0	3.23	16.5
Osceola	53	−12	22.2	3.50	6.5
Oshkosh	47	−3	24.3	1.93	
Pine River	44	−5	22.7	3.04	2.2
Portage	48[c]	−1[c]	24.3[c]	2.22	4.0
Port Washington	46	3	25.8	1.90	2.5
Prairie du Chien	53	4	27.4	2.86	3.5
Prentice	46	−27	16.8	1.10	9.5

TABLE II.—*Climatological record of cooperative observers*—Continued. *Late reports for February, 1906.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Wisconsin—Cont'd.	°	°	°	*Ins.*	*Ins.*
Racine	51	4	28.8	1.59	......
Sheboygan	42	0	27.0	2.43	5.5
Shullsburg	47	0	24.9	2.03	3.9
Spooner	48	−17	18.3	1.21	7.5
Stanley	46	−13	20.8	2.19	10.5
Stevens Point	46[d]	−12[d]	20.6[d]	3.08	......
Sturgeon Bay	46	−12	22.3	7.18	11.6
Valley Junction	47	− 6	21.6	5.15	1.5
Viroqua	46	− 2	23.6	3.66	6.3
Watertown	50	0	24.8	2.43	2.9
Waukesha	......	......	......	1.61	3.8
Waupaca	45	− 4	21.6	3.90	2.2
Wausau	49	−11	21.4	1.46	8.5
Whitehall	53	− 8	23.0	1.70	5.0
Wyoming.					
Afton	53	−20	24.6	2.58	20.5
Barnum	......	......	......	1.37	17.0
Barrett Creek Cabin	58	−19	25.0	4.60	47.0
Bedford	50	−27	24.4	2.14	14.5
Border	46	−36	19.0	1.72	......
Buffalo	66	−27	21.5	1.62	14.2
Cambria	69	−14	25.3	0.45	4.5
Chugwater	70	−24	24.6	2.65	21.5
Clark	......	......	......	0.76	9.8
Clear Creek Cabin	56	−28	18.0	3.62	36.0
Cody	68	−25	24.5	1.50	15.0
Daniel	45	−45	15.7	2.30	23.0
Devil's Gate Creek Cabin	50	−27	22.2	2.50	25.0
Elk Mountain	......	......	......	2.91	35.0
Embar	51	−25	18.8	1.80	18.0
Evanston	49	−22	25.0	2.26	16.0
Experiment Farm	......	......	......	1.42	14.0
Fayette	50	−37	18.2	2.15	21.5
Fontenelle	48	−32	16.8	4.65	46.5
Fort Washakie	68	−27	20.6	1.95	18.5
Gillette	70	−21	24.2	2.50	18.0
Granite Canyon	60	−18	24.4	2.06	25.3
Granite Springs	......	......	......	2.67	......
Green River	60	−21	24.0	1.11	16.0
Griggs	67	−28	24.0	1.92	10.4
Hatton	......	......	......	4.70	47.0
Hyattville	75	−23	25.6	......	......
Jackson	......	......	......	3.00	30.0
Kirtley	65	−17	21.6	1.21	12.2
Leo	56	−26	21.9	2.16	23.0
Little Medicine	54	−25	19.2	2.25	24.8
Lolabama Ranch	......	......	......	1.60	15.5
Moorecroft	70	−21	21.4	0.60	6.0
Pathfinder	62	−29	25.0	1.38	18.2
Phillips	70	−17	26.6	3.40	33.0
Pine Bluff	70	−14	24.8	3.90	......
Pinedale	51	−38	17.2	1.95	24.9
Rambler	44	−18	18.2	1.74	......
Rawlins	57	−19	24.3	1.60	14.0
Saratoga	58	−22	25.7	2.11	22.6
Sheridan	69	−26	23.7	2.10	18.0
Shoshone Canyon	67	−16	23.4	0.62	......
South Pass City	54	−33	16.6	5.40	54.0
Thayne	51	−29	23.2	2.95	22.3
Wheatland	63	−21	25.4	3.89	......
Wolf	63	−19	25.8	3.32	33.0
Yellowstone Pk. (Fount).	53	−35	20.0	2.20	22.0
Yellowstone Pk. (G. Can.)	50	−36	17.8	......	......
Yellowstone Pk (Riv'side)	57	−36	20.6	2.03	24.0
Yellowstone Pk (Snake R)	62	−50	20.8	......	54.0
Yellowstone Pk. (Soda B.)	55	−40	18.0	1.39	15.0
Yellowstone Pk. (Up. B.).	56	−41	19.8	4.95	20.0
Porto Rico.					
Adjuntas	90	47	68.6	7.28	
Aguas Buenas	......	......	......	3.66	
Aguirre	93	60	76.7	1.69	
Porto Rico—Cont'd.	°	°	°	*Ins.*	*Ins.*
Aibonita	82	49	68.3	4.35	
Anasco	91	60	76.4	3.19	
Arecibo	92	53	72.6	3.60	
Barros	84	52	69.4	5.15	
Bayamon	90	56	73.6	5.52	
Caguas	90	55	73.8	2.33	
Canovanas	89	66	77.1	5.65	
Cayey	85	70	77.2	1.89	
Cidra	88	54	71.0	1.68	
Coamo	90	56	76.8	0.80	
Coloso	88	62	75.4	2.42	
Carozal	92	53	75.4	0.90	
Fajardo	87	64	76.4	3.96	
Guanica	90	59	75.2	5.19	
Hacienda Josefa	......	......	......	0.41	
Humacao	85	60	74.8	5.18	
Ingenio	......	......	......	2.83	
Isabela	88	68	78.4	2.90	
Juana Diaz	91	63	77.6	2.47	
La Carmelita	87	59	71.1	4.67	
La Isolina	88	57	71.4	6.86	
Lares	91	53	73.0	4.69	
Las Cruces	85	57	69.5	5.78	
Las Marias	88	58	73.4	3.74	
Manati	95	58	75.7	8.13	
Maunabo	90	64	77.3	6.52	
Mayaguez	90	57	74.5	3.76	
Morovis	92	54	72.7	6.28	
Rio Blanco	88	57	75.0	5.54	
Rio Piedras	......	......	......	3.22	
San German	90	60	75.2	7.44	
San Lorenzo	91	57	74.2	2.32	
San Salvador	84	58	70.3	5.77	
Santa Isabel	88	58	75.3	0.39	
Vieques	89	60	78.3	1.61	
Yauco	87	58	74.2	4.57	
New Brunswick.					
St. John	44	0	24.5	7.21	23.4
West Indies.					
Basseterre, St. Kitts	83	67	76.6	2.69	
Hamilton, Ber.	74	46	62.3	......	

Late reports for February, 1906.

Stations.	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Alaska.	°	°	°	*Ins.*	*Ins.*
Chestochena	......	......	......	0.60	6.0
Copper Center	24	−31	−3.6	0.19	2.8
Fairbanks	21	−38	0.2	0.37	3.7
Fort Egbert	......	......	......	0.06	1.0
Fort Gibbon	32	−41	5.8	0.20	2.0
Fort Liscum	38	7	24.0	1.83	13.5
Kenai	38	−15	20.8	0.10	1.0
Ketchemstock	12	−46	−12.0	0.05	0.5
North Fork	......	......	......	0.50	5.0
Rampart	19	−40	− 5.2	0.08	2.0
Summit	30	−25	9.6	0.46	5.0
Sunrise	51	−10	24.3	0.29	3.7
Teikhill	27	−19	4.8	0.20	2.0
Florida.					
Apalachicola	75[e]	35[e]	56.2[e]	2.15	
Stephensville	79[e]	30[e]	55.2[e]	1.87	
Illinois.					
Cambridge	55	0	27.0	2.13	3.5
Iowa.					
Clinton	54	0	25.4	2.37	1.2
Kentucky.					
Middleboro	69	9	38.2	1.77	
Princeton	67	− 1	35.6	2.05	1.4
Massachusetts.	°	°	°	*Ins.*	*Ins.*
Bedford	55	− 1	27.0	2.30	9.0
Leominster	......	......	......	2.29	10.5
Michigan.					
Ishpeming	44	−25	11.1	1.95	19.5
Montana.					
Forsyth	64	−13	28.2	1.00	10.0
Nevada.					
Ely	53	8	32.8	......	......
New Mexico.					
Fruitland	67	18	38.7	0.30	T.
North Dakota.					
Power	44[e]	−35[e]	7.8[e]	0.29	2.5
South Dakota.					
Dallas	66	−16	23.8	0.20	2.0
Texas.					
Victoria	82	28	54 4	2.01	......
Virginia.					
Rocky Mount	70	3	38.5	1.00	5.0
Washington.					
Pullman	54	20	35.6	2.27	3.0
West Virginia.					
Fairmount	71	− 3	32.1	1.62	6.5
Franklin	67[e]	0[e]	31.8[e]	0.96	9.2
Green Sulphur Springs	71	3	36.8	0.73	1.0
Wisconsin.					
Downing	45	−30	12.2	T.	T.
Prairie du Chien	54	−22	21.8	1.50	8.0
Wyoming.					
Fontenelle	40	−22	14.4	0.30	3.0
Rambler	36[1]	− 6	18.7*	......	......
Rawlins	47	− 3	26.1	0.05	0.9
Sheridan	60	−12	29.8	0.60	4.0
Yellowstone Park Thumb.	38	−26	12.7	......	73.5
Porto Rico.					
Aguas Buenas	......	......	......	1.75	

EXPLANATION OF SIGNS.

* Extremes of temperature from observed readings of dry thermometer.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

[1] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. ÷ 4.
[2] Mean of 8 a. m. + 8 p. m. ÷ 2.
[3] Mean of 7 a. m. + 7 p. m. ÷ 2.
[4] Mean of 6 a. m. + 6 p. m. ÷ 2.
[5] Mean of 7 a. m. + 2 p. m. ÷ 2.
[6] Mean of readings at various hours reduced to true daily mean by special tables.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston *a*," "Livingston *b*," indicates that two or more observers, as the case may be, are reporting from the same station. A small roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance, "n" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks of whatever duration, in the precipitation record receive appropriate notice.

CORRECTIONS.

February, 1906, Kentucky, Owenton, make mean temperature 32.4 instead of 32.9; Virginia, Newport News, make mean temperatue 39.8 instead of 39.9.

TABLE III.—*Wind resultants, from observations at 8 a. m. and 8 p. m., daily, during the month of March, 1906.*

Stations.	Component direction from— N.	S.	E.	W.	Resultant. Direction from—	Duration.
	Hours.	Hours.	Hours.	Hours.	°	Hours.
New England.						
Eastport, Me	21	13	7	34	n. 73 w.	28
Portland, Me	26	13	6	32	n. 63 w.	29
Concord, N. H.†	15	3	3	14	n. 43 w.	16
Northfield, Vt	24	26	7	15	s. 76 w.	8
Boston, Mass	20	14	4	33	n. 78 w.	30
Nantucket, Mass	19	17	16	25	n. 77 w.	9
Block Island, R. I	20	14	14	29	n. 68 w.	16
Providence, R. I	19	12	9	35	n. 75 w.	27
Hartford, Conn	30	14	5	25	n. 51 w.	26
New Haven, Conn	26	13	14	24	n. 38 w.	16
Middle Atlantic States.						
Albany, N. Y	32	14	10	19	n. 27 w.	20
Binghamton, N. Y.†	13	6	8	11	n. 23 w.	8
New York, N. Y	21	7	15	28	n. 43 w.	19
Harrisburg, Pa	17	8	24	23	n. 6 e.	9
Philadelphia, Pa	29	11	16	20	n. 13 w.	18
Scranton, Pa	22	18	15	22	n. 60 w.	8
Atlantic City, N. J	27	9	18	23	n. 16 w.	19
Cape May, N. J	31	11	15	16	n. 3 w.	20
Baltimore, Md	26	11	20	21	n. 4 w.	15
Washington, D. C	32	12	17	18	n. 3 w.	20
Cape Henry, Va	11	11	11	4	e.	7
Lynchburg, Va	25	12	22	20	n. 9 e.	13
Mount Weather, Va	22	15	19	21	n. 16 w.	7
Norfolk, Va	28	17	23	11	n. 47 e.	16
Richmond, Va	30	15	17	15	n. 4 e.	15
Wytheville, Va	12	8	20	31	n. 70 w.	12
South Atlantic States.						
Asheville, N. C	24	23	17	16	n. 45 e.	1
Charlotte, N. C	23	16	22	17	n. 36 e.	9
Hatteras, N. C	27	12	19	20	n. 4 w.	15
Raleigh, N. C	32	11	13	21	n. 21 w.	22
Wilmington, N. C	24	15	17	19	n. 13 w.	9
Charleston, S. C	16	24	17	17	s.	8
Columbia, S. C	18	17	18	24	n. 80 w.	6
Augusta, Ga	19	14	16	27	n. 66 w.	12
Savannah, Ga	14	22	13	26	s. 58 w.	15
Jacksonville, Fla	19	18	24	17	n. 82 e.	7
Florida Peninsula.						
Jupiter, Fla	19	21	18	16	s. 45 e.	3
Key West, Fla	26	10	34	8	n. 58 e.	30
Tampa, Fla	26	10	22	20	n. 7 e.	16
Eastern Gulf States.						
Atlanta, Ga	15	12	20	29	n. 72 w.	10
Macon, Ga.†	13	7	7	13	n. 45 w.	8
Thomasville, Ga†	11	7	11	11	n.	4
Pensacola, Fla.†	12	8	10	8	n. 27 e.	4
Anniston, Ala	20	29	14	13	s. 6 e.	9
Birmingham, Ala.†	13	8	10	11	n. 11 w.	5
Mobile, Ala	23	23	15	12	e.	3
Montgomery, Ala	18	18	17	21	w.	4
Meridian, Miss.†	10	8	6	13	n. 74 w.	7
Vicksburg, Miss	19	20	22	17	s. 79 e.	5
New Orleans, La	22	21	19	13	n. 80 e.	6
Western Gulf States.						
Shreveport, La	21	19	18	21	n. 56 w.	4
Fort Smith, Ark	21	8	25	18	n. 28 e.	15
Little Rock, Ark	32	9	16	19	n. 7 w.	23
Corpus Christi, Tex	19	21	26	7	s. 84 e.	19
Fort Worth, Tex	23	19	16	17	n. 14 w.	4
Galveston, Tex	15	19	29	14	s. 75 e.	16
Palestine, Tex	26	20	15	15	n.	6
San Antonio, Tex	26	17	22	10	n. 53 e.	15
Taylor, Tex.†	15	10	6	6	n.	5
Ohio Valley and Tennessee.						
Chattanooga, Tenn	21	20	16	23	n. 82 w.	7
Knoxville, Tenn	28	15	11	24	n. 45 w.	18
Memphis, Tenn	26	12	21	17	n. 16 e.	15
Nashville, Tenn	30	12	11	22	n. 30 w.	22
Lexington, Ky.†	11	5	12	10	n. 18 e.	6
Louisville, Ky	26	11	13	24	n. 36 w.	19
Evansville, Ind.†	17	4	9	8	n. 4 e.	13
Indianapolis, Ind	26	11	17	23	n. 22 w.	16
Cincinnati, Ohio	28	11	20	19	n. 3 e.	17
Columbus, Ohio	17	13	22	21	n. 14 e.	4
Pittsburg, Pa	32	8	14	24	n. 23 w.	26
Parkersburg, W. Va	26	13	13	18	n. 21 w.	14
Elkins, W. Va	18	16	14	25	n. 80 w.	11
Lower Lake Region.						
Buffalo, N. Y	15	17	18	26	s. 76 w.	8
Oswego, N. Y	22	23	17	16	s. 45 e.	1
Rochester, N. Y	12	17	16	31	s. 72 w.	16
Syracuse, N. Y	13	17	16	26	s. 68 w.	11
Erie, Pa	17	8	20	27	n. 38 w.	11
Cleveland, Ohio	25	20	15	17	n. 22 w.	5
Sandusky, Ohio†	9	7	11	11	n.	2
Toledo, Ohio	17	13	21	23	n. 27 w.	4
Detroit, Mich	20	10	19	24	n. 27 w.	11
Upper Lake Region.						
Alpena, Mich	25	9	10	30	n. 51 w.	26
Escanaba, Mich	31	12	13	18	n. 15 w.	20
Grand Haven, Mich	24	12	18	23	n. 23 w.	13
Grand Rapids, Mich	28	13	19	16	n. 11 e.	15
Houghton, Mich.†	12	3	14	11	n. 18 e.	10
Marquette, Mich	22	8	12	32	n. 55 w.	24
Port Huron, Mich	22	16	19	19	n.	6
Sault Ste. Marie, Mich	23	11	16	25	n. 37 w.	15
Chicago, Ill	26	12	17	24	n. 27 w.	16
Milwaukee, Wis	26	12	13	23	n. 36 w.	17
Green Bay, Wis	29	11	13	21	n. 24 w.	20
Duluth, Minn	26	8	10	30*	n. 48 w.	27
North Dakota.						
Moorhead, Minn	31	17	14	18	n. 16 w.	15
Bismarck, N. Dak	29	11	18	21	n. 9 w.	18
Devils Lake, N. Dak	22	14	11	27	n. 63 w.	18
Williston, N. Dak	27	17	20	17	n. 17 e.	10
Upper Mississippi Valley.						
Minneapolis, Minn.*	13	8	5	16	n. 66 w.	12
St. Paul, Minn	30	14	13	20	n. 24 w.	18
La Crosse, Wis.†	15	6	7	8	n. 6 w.	9
Madison, Wis	25	14	13	25	n. 47 w.	16
Charles City, Iowa	.....	.....	.....	.....	.....	.....
Davenport, Iowa	26	8	25	18	n. 21 e.	19
Des Moines, Iowa	27	12	19	21	n. 8 w.	15
Dubuque, Iowa	30	12	15	19	n. 13 w.	18
Keokuk, Iowa	27	11	17	20	n. 11 w.	16
Cairo, Ill	33	9	16	15	n. 2 e.	24
La Salle, Ill.†	12	5	9	11	n. 16 w.	7
Peoria, Ill	27	13	17	20	n. 12 w.	14
Springfield, Ill	26	14	16	20	n. 18 w.	13
Hannibal, Mo.†	16	6	8	10	n. 11 w.	10
St. Louis, Mo	27	11	26	16	n. 32 e.	19
Missouri Valley.						
Columbia, Mo.*	17	3	9	8	n. 4 e.	14
Kansas City, Mo	30	11	23	16	n. 20 e.	20
Springfield, Mo	26	12	24	15	n. 33 e.	17
Iola, Kans.†	11	8	15	6	n. 72 e.	10
Topeka, Kans.*	13	3	10	9	n. 6 e.	10
Lincoln, Nebr	31	12	20	13	n. 20 e.	20
Omaha, Nebr	28	12	18	17	n. 3 e.	16
Valentine, Nebr	24	13	17	19	n. 10 w.	11
Sioux City, Iowa†	12	8	9	10	n. 14 w.	4
Pierre, S. Dak	21	14	22	19	n. 23 e.	8
Huron, S. Dak	27	17	13	19	n. 31 w.	12
Yankton, S. Dak.†	9	5	7	15	n. 63 w.	9
Northern Slope.						
Havre, Mont	14	7	30	20	n. 55 e.	12
Miles City, Mont	21	17	22	16	n. 56 e.	7
Helena, Mont	22	17	5	32	n. 80 w.	28
Kalispell, Mont	13	10	17	28	n. 75 w.	11
Rapid City, S. Dak	21	15	19	19	n.	6
Cheyenne, Wyo	26	22	9	19	n. 68 w.	11
Lander, Wyo	19	19	21	18	e.	3
Yellowstone Park, Wyo	19	24	5	29	s. 78 w.	24
North Platte, Nebr	23	12	24	21	n. 15 e.	11
Middle Slope.						
Denver, Colo	36	13	13	6	n. 17 e.	24
Pueblo, Colo	24	8	32	10	n. 54 e.	27
Concordia, Kans	28	12	15	15	n.	16
Dodge, Kans	27	8	22	17	n. 15 e.	20
Wichita, Kans	36	7	23	14	n. 17 e.	30
Oklahoma, Okla	34	11	19	7	n. 28 e.	26
Southern Slope.						
Abilene, Tex	28	19	9	14	n. 29 w.	10
Amarillo, Tex	24	19	20	16	n. 39 e.	6
Del Rio, Tex†	9	5	15	7	n. 63 e.	9
Roswell, N. Mex	27	18	12	15	n. 18 w.	10
Southern Plateau.						
El Paso, Tex	19	5	13	39	n. 62 w.	30
Santa Fe, N. Mex	19	21	13	26	s. 81 w.	13
Flagstaff, Ariz	13	21	11	33	s. 70 w.	23
Phoenix, Ariz	9	15	27	23	s. 34 e.	7
Yuma, Ariz	19	12	12	29	n. 68 w.	18
Independence, Cal	19	23	9	24	s. 75 w.	16
Middle Plateau.						
Reno, Nev	6	26	12	33	s. 46 w.	29
Winnemucca, Nev	24	14	20	20	n.	10
Modena, Utah	9	13	15	34	s. 78 w.	19
Salt Lake City, Utah	18	21	20	17	s. 45 e.	4
Durango, Colo	17	23	5	27	s. 75 w.	23
Grand Junction, Colo	19	16	19	20	n. 18 w.	3
Northern Plateau.						
Baker City, Oreg	13	35	14	13	s. 3 e.	22
Boise, Idaho	16	21	19	21	s. 22 w.	5
Lewiston, Idaho†	3	3	27	1	e.	26
Pocatello, Idaho	6	24	19	29	s. 29 w.	21
Spokane, Wash	24	15	32	10	n. 68 e.	24
Walla Walla, Wash	11	35	16	13	s. 7 e.	24
North Pacific Coast Region.						
North Head, Wash	11	16	38	8	s. 81 e.	30
Port Crescent, Wash.*	12	7	14	8	n. 50 e.	8
Seattle, Wash	22	17	25	12	n. 69 e.	14
Tacoma, Wash	23	19	16	11	n. 51 e.	6
Tatoosh Island, Wash	14	20	31	7	s. 76 e.	25
Portland, Oreg	19	15	26	16	n. 68 e.	11
Roseburg, Oreg	26	18	20	19	n. 7 e.	8
Middle Pacific Coast Region.						
Eureka, Cal	12	31	21	15	s. 18 e.	20
Mount Tamalpais, Cal	14	22	18	24	s. 37 w.	10
Red Bluff, Cal	19	29	16	14	s. 11 e.	10
Sacramento, Cal	14	31	21	11	s. 30 e.	20
San Francisco, Cal	18	21	10	29	s. 81 w.	19
San Jose, Cal.†	7	11	5	13	s. 63 w.	9
Southeast Farallon, Cal	9	13	4	11	s. 60 w.	8
South Pacific Coast Region.						
Fresno, Cal	24	27	16	12	s. 53 e.	5
Los Angeles, Cal	12	18	19	28	s. 56 w.	11
San Diego, Cal	20	17	13	25	n. 76 w.	12
San Luis Obispo, Cal	20	26	9	20	s. 61 w.	12
West Indies						
Grand Turk, W. I.†	6	10	22	2	s. 79 e.	20
Hamilton, Bermuda	20	24	15	16	s. 14 w.	4
San Juan, Porto Rico	5	26	40	3	s. 60 e.	42

* From observations at 8 p. m. only. † From observations at 8 a. m. only.

TABLE IV.—*Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.75 in 1 hour, during March, 1906, at all stations furnished with self-registering gages.*

Stations.	Date.	Total duration.		Total amount of precipitation.	Excessive rate.		Amount before excessive began.	Depths of precipitation (in inches) during periods of time indicated.													
		From—	To—		Began—	Ended—		5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Albany, N. Y	19-20			0.84														*			
Alpena, Mich	3			1.35														*			
Amarillo, Tex	27			0.37														0.12			
Asheville, N. C	14-15			1.05														*			
Atlanta, Ga	18-19			3.21														0.65			
Atlantic City, N. J	3-4	10:55 p. m.	D. N.	1.35	11:06 p. m.	11:36 p. m.	0.03	0.05	0.10	0.19	0.30	0.48	0.53								
Augusta, Ga	18-19			1.01														0.40			
Baltimore, Md	3			1.39														0.62			
Binghamton, N. Y	3			0.80														0.22			
Birmingham, Ala	27	4:30 a. m.	11:35 a. m.	1.58	7:45 a. m.	8:37 a. m.	0.56	0.12	0.17	0.22	0.27	0.33	0.37	0.44	0.57	0.70	0.83	0.88			
Bismarck, N. Dak	12-13			0.20														*			
Block Island, R. I	3-4			1.76														0.26			
Boise, Idaho	31			0.56														0.12			
Boston, Mass	3-4			1.97														0.35			
Buffalo, N. Y	19-20			0.88														*			
Cairo, Ill	26			1.07														0.40			
Charles City, Iowa	25-26			2.06														*			
Charleston, S. C	7-8			1.24														0.11			
Charlotte, N. C	19			1.48														0.29			
Chattanooga, Tenn	14			1.34														0.18			
Cheyenne, Wyo	9-10			0.57														*			
Chicago, Ill	26-27			0.36														*			
Cincinnati, Ohio	29-30			1.36														0.21			
Cleveland, Ohio	19-20			0.64														0.10			
Columbia, Mo	18-19			0.80														*			
Columbia, S. C	7-8			1.66														0.27			
Columbus, Ohio	2-3			0.97														*			
Concord, N. H	19-20			0.82														*			
Corpus Christi, Tex	6-7	9:01 a. m.	1:30 a. m.	1.79	5:46 p. m.	6:16 p. m.	0.98	0.08	0.18	0.26	0.31	0.51	0.61								
Do	14	7:31 a. m.	11:24 a. m.	0.52	10:44 a. m.	10:54 a. m.	0.04	0.25	0.46												
Davenport, Iowa	26			1.05														*			
Denver, Colo	1			0.59														*			
Des Moines, Iowa	25-26			0.87														*			
Detroit, Mich	19			0.67														*			
Dodge, Kans	5-6			0.31														*			
Dubuque, Iowa	26			1.08														*			
Duluth, Minn	2-3			0.59														*			
Eastport, Me	3-4			1.74														0.39			
Elkins, W. Va	13-14			1.01														0.12			
Erie, Pa	19-20			1.27														*			
Escanaba, Mich	25-26			1.30														*			
Evansville, Ind	26	4:20 p. m.	8:50 p. m.	1.41	4:45 p. m.	5:10 p. m.	0.01	0.09	0.26	0.37	0.40	0.48									
					6:32 p. m.	7:02 p. m.	0.60	0.06	0.18	0.34	0.40	0.50	0.56								
Fort Smith, Ark	23-24			1.09														0.52			
Fort Worth, Tex	1	8:05 p. m.	9:00 p. m.	0.45	8:31 p. m.	8:41 p. m.	0.02	0.17	0.43												
Galveston, Tex	18			0.92														0.39			
Grand Rapids, Mich	2			0.73														0.15			
Green Bay, Wis	25-26			1.75														*			
Hannibal, Mo	10-11			0.73														*			
Harrisburg, Pa	3			1.53														0.41			
Hartford, Conn	3-4			2.66														0.39			
Hatteras, N. C	3-4	10:45 p. m.	1:10 a. m.	0.71	12:47 a. m.	1:00 a. m.	0.09	0.19	0.53	0.62											
Huron, S. Dak	2			1.04														*			
Indianapolis, Ind	29-30			1.43														0.26			
Iola, Kans	1			0.51														0.37			
Jacksonville, Fla	31			0.20														0.13			
Jupiter, Fla	7-8			0.98														0.45			
Kansas City, Mo	18-19			0.70														*			
Key West, Fla	7	8:00 p. m.	11:00 p. m.	1.19	9:10 p. m.	9:49 p. m.	0.03	0.23	0.53	0.58	0.66	0.81	0.90	0.99	1.14						
Knoxville, Tenn	2-3			0.83														0.51			
La Crosse, Wis	25-26			1.54														*			
La Salle, Ill	26-27			0.85														0.32			
Lexington, Ky	29-30			1.41														*			
Lincoln, Nebr	25			1.96														*			
Little Rock, Ark	28-29			1.28														0.16			
Los Angeles, Cal	11-12			1.81														0.36			
Louisville, Ky	29-30			1.96														0.37			
Lynchburg, Va	3			1.31														0.84			
Macon, Ga	18-19			1.20														0.60			
Madison, Wis	26-27			1.01														0.23			
Memphis, Tenn	26	12:08 p. m.	5:30 p. m.	1.25	4:10 p. m.	4:37 p. m.	0.47	0.11	0.15	0.19	0.35	0.65	0.74								
Meridian, Miss	18-19	6:02 a. m.	6:45 a. m.	5.78	9:08 p. m.	9:38 p. m.	2.92	0.06	0.11	0.21	0.45	0.58	0.65								
Milwaukee, Wis	2-3			0.48														0.06			
Minneapolis, Minn	2			0.28														*			
Montgomery, Ala	19	D. N.	9:20 a. m.	1.52	7:50 a. m.	8:07 a. m.	0.92	0.17	0.28	0.38	0.46										
Do	27	3:35 p. m.	10:20 p. m.	2.72	4:10 p. m.	5:12 p. m.	0.25	0.21	0.22	0.29	0.51	0.62	0.64	0.71	0.82	0.85	1.03	1.26			
Mount Weather, Va	14-15			0.95														*			
Nantucket, Mass	19-20			1.84														0.37			
Nashville, Tenn	26			0.99														0.52			
New Haven, Conn	3-4			3.11														0.63			
New Orleans, La	14	9:15 a. m.	4:35 p. m.	1.53	11:22 a. m.	11:38 a. m.	0.10	0.27	0.74	0.92											
Do	28	2:08 p. m.	6:35 p. m.	1.04	3:26 p. m.	4:08 p. m.	0.14	0.06	0.13	0.22	0.31	0.41	0.48	0.52	0.62						
New York, N. Y	3-4			2.44														*			
Norfolk, Va	19			0.77														0.48			
Northfield, Vt	3-4			1.11														*			
North Head, Wash	29-30			0.64														0.07			
Oklahoma, Okla	26			0.88														0.85			
Omaha, Nebr	25-26			0.44														0.13			
Palestine, Tex	6-7			0.48														0.13			
Parkersburg, W. Va	24			0.87														0.08			
Pensacola, Fla	2-3	11:10 p. m.	4:00 a. m.	1.57	12:40 a. m	1:28 a. m.	0.02	0.35	0.42	0.62	0.86	0.86	1.01	1.15	1.22	1.24	1.30				
Peoria, Ill	26			0.65														*			
Philadelphia, Pa	3-4	8:05 p. m.	D. N.	1.38	9:47 p. m.	10:16 p. m.	0.16	0.08	0.32	0.40	0.45	0.59	0.64								
Pittsburg, Pa	30-31			0.89														0.23			
Portland, Me	15-16			1.30														*			
Portland, Oreg	2-3			0.60														0.11			
Pueblo, Colo	26-27			0.54														*			
Raleigh, N. C	30			1.16														0.48			
Richmond, Va	14-15			1.45														0.25			
Rochester, N. Y	3			0.79														0.13			

TABLE IV.—*Accumulated amounts of precipitation for each 5 minutes, etc.*—Continued.

Stations.	Date.	Total duration.		Total amount of precipitation.	Excessive rate.		Amount before excessive began.	Depths of precipitation (in inches) during periods of time indicated.													
		From—	To—		Began—	Ended—		5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Sacramento, Cal	30-31	5:35 p. m.	D. N.	1.91	6:10 p. m.	6:44 p. m.	0.04	0.13	0.35	0.39	0.42	0.57	0.79	0.87							
St. Louis, Mo	30			1.52														0.12			
St. Paul, Minn	25-26			0.42														0.10			
Salt Lake City, Utah	12-13			0.75														*			
San Antonio, Tex	27-28			0.93														0.37			
San Diego, Cal	24-25			2.40														0.55			
Sandusky, Ohio	19-20			0.70														*			
San Francisco, Cal	23			1.37														0.39			
Savannah, Ga	19			0.48														0.42			
Scranton, Pa	3			1.53														0.41			
Seattle, Wash	30-31			0.36														0.11			
Shreveport, La	27-28			1.51														0.37			
Spokane, Wash	21-22			0.22														0.14			
Springfield, Ill	18-19			1.02														*			
Springfield, Mo	22-23			2.68														*			
Syracuse, N. Y	3			1.86														*			
Tampa, Fla	15	D. N.	6:15 a. m.	0.87	3:35 a. m.	4:00 a. m.	0.09	0.06	0.26	0.44	0.63	0.70									
Taylor, Tex.	27-28			0.63														0.34			
Toledo, Ohio	19			0.58														*			
Topeka, Kans	18-19			0.66														*			
Valentine, Nebr	1-2			1.28														*			
Vicksburg, Miss	27	10:57 a. m.	4:30 p. m.	1.22	11:06 a. m.	11:26 a. m.	0.04	0.12	0.25	0.45	0.50										
Do	27-28	11:25 p. m.	6:45 a. m.	2.08	4:14 a. m.	4:49 a. m.	1.24	0.08	0.16	0.31	0.43	0.47	0.52	0.57							
Washington, D. C	3-4			0.99														0.42			
Wichita, Kans	1			0.34														0.34			
Williston, N. Dak.	12-13			0.11														*			
Wilmington, N. C.	14-15			0.90														0.52			
Wytheville, Va.	14-15			0.83														0.11			
Yankton, S. Dak	1-2			1.09														*			
San Juan, Porto Rico	1-2			1.33														0.40			

* Self-register not working

TABLE V.—*Data furnished by the Canadian Meteorological Service, March, 1906.*

Stations.	Pressure, in inches.			Temperature.				Precipitation.		
	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hours.	Departure from normal.	Mean.	Departure from normal.	Mean maximum.	Mean minimum.	Total.	Departure from normal.	Total snowfall.
	Ins.	Ins.	Ins.	°	°	°	°	Ins.	Ins.	Ins.
St. Johns, N. F	29.72	29.86	-.02	25.8	- 1.9	33.3	18.3	7.30	+2.54	2.1
Sydney, C. B. I	29.90	29.94	+.06	26.7	+ 0.5	35.6	17.7	6.49	+1.56	20.5
Halifax, N. S.	29.87	29.98	+.04	28.3	- 0.7	35.7	20.9	7.15	+1.69	9.7
Grand Manan, N. B	29.90	29.95	+.02	28.0	- 1.8	35.0	21.0	7.24	+2.96	17.8
Yarmouth, N. S	29.93	30.00	+.05	29.1	- 1.7	35.4	22.8	7.05	+2.20	13.0
Charlottetown, P. E. I	29.89	29.93	+.03	23.7	- 1.7	31.3	16.1	4.18	+0.97	15.8
Chatham, N. B	29.80	29.92	+.02	22.4	- 0.6	34.1	10.6	4.02	+0.55	31.6
Father Point, Que.	29.92	29.95	+.05	19.1	- 1.2	26.6	11.6	3.18	+0.45	28.2
Quebec, Que	29.69	30.03	+.07	17.9	- 3.3	26.7	9.0	3.16	-0.10	21.7
Montreal, Que	29.85	30.07	+.07	21.7	- 2.1	28.0	15.5	3.12	-0.67	17.9
Rockliffe, Ont.	29.46	30.09	+.08	16.4	- 2.6	29.7	3.1	0.50	-1.56	4.0
Ottawa, Ont	29.72	30.06	+.05	22.8	+ 1.3	30.3	15.2	2.15	-0.57	10.3
Kingston, Ont.	29.78	30.11	+.10	24.3	- 1.3	31.5	17.1	2.79	+0.15	9.9
Toronto, Ont	29.70	30.10	+.08	27.0	- 0.3	33.2	20.8	2.55	-0.09	12.3
White River, Ont	28.74	30.12	+.09	7.2	- 5.0	23.8	- 9.3	1.71	+0.33	17.1
Port Stanley, Ont	29.44	30.10	+.07	26.4	- 0.8	32.6	20.2	2.57	-0.31	9.6
Saugeen, Ont	29.36	30.10	+.07	23.7	- 1.0	31.0	16.3	2.90	+0.25	19.3

Stations.	Pressure, in inches.			Temperature.				Precipitation.		
	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hours.	Departure from normal.	Mean.	Departure from normal.	Mean maximum.	Mean minimum.	Total.	Departure from normal.	Total snowfall.
	Ins.	Ins.	Ins.	°	°	°	°	Ins.	Ins.	Ins.
Parry Sound, Ont	29.37	30.11	+.09	20.0	- 1.1	29.6	10.5	3.43	+1.20	11.0
Port Arthur, Ont.	29.42	30.16	+.11	17.6	+ 0.8	28.3	6.9	0.55	-0.42	5.5
Winnipeg, Man	29.34	30.21	+.12	16.0	+ 3.7	27.1	5.0	0.54	-0.49	5.4
Minnedosa, Man	28.31	30.21	+.15	17.5	+ 5.0	28.9	6.1	0.42	-0.23	4.2
Qu'Appelle, Assin	27.84	30.19	+.15	17.0	+ 2.1	27.0	6.9	0.22	-0.55	1.1
Medicine Hat, Assin	27.80	30.15	+.15	27.4	- 0.1	41.7	13.2	0.05	-0.71	0.5
Swift Current, Assin	27.55	30.23	+.21	22.9	+ 0.9	34.9	10.9	0.02	-0.79	0.2
Calgary, Alberta	26.49	30.17	+.22	25.4	- 0.8	39.1	11.6	0.70	-0.02	7.0
Banff, Alberta	25.39	30.15	+.21	24.3		36.8	11.8	0.19	-1.22	1.7
Edmonton, Alberta										
Prince Albert, Sask	28.53	30.17	+.09	14.4	+ 2.4	27.7	1.2	T.	-0.77	T.
Battleford, Sask	28.43	30.26	+.20	17.1	+ 4.0	28.5	5.6	0.07	-0.39	0.6
Kamloops, B. C.	28.78	30.03	+.11	38.8	+ 2.7	49.9	27.7	0.10	-0.47	0.0
Victoria, B. C.	29.90	30.00	+.03	44.5	+ 2.6	51.7	37.2	0.67	-2.45	T.
Barkerville, B. C.	25.66	30.05	+.17	26.0	- 0.1	36.5	15.4	0.71	-1.18	3.0
Hamilton, Bermuda	30.00	30.17	+.09	63.2	+ 1.0	68.3	58.2	6.94	+1.81	
Dawson, Yukon	28.91			11.8		22.5	1.2	0.22		2.2

TABLE VI.—*Heights of rivers referred to zeros of gages, March, 1906.*

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water. Height.	Highest water. Date.	Lowest water. Height.	Lowest water. Date.	Mean stage.	Monthly range.
	Miles.	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Milk River.								
Havre, Mont. (14)	237	9	4.4	31	3.0	10, 25, 26	3.6	1.4
Musselshell River.								
Musselshell, Mont. (25)	87	9	.....	.....	.....	.....	.....	.....
Yellowstone River.								
Billings, Mont. (a)	330	8	2.7	26	−0.7	24	0.6	3.4
Cheyenne River.								
Rosseau, S. Dak. (29)	7	9	.....	.....	.....	.....	.....	.....
James River.								
Lamoure, N. Dak. (31)	330	14	.....	.....	.....	.....	.....	.....
Huron, S. Dak. (24)	139	9	.....	.....	.....	.....	.....	.....
Big Blue River.								
Beatrice, Nebr. (2)	92	14	5.5	29	2.3	14–16, 18, 19, 21–23	2.7	3.2
Blue Rapids, Kans. (6)	47	14	8.8	29	5.2	20	6.1	3.6
Republican River.								
Clay Center, Kans.	42	18	8.5	30	5.9	13, 15–18	6.7	2.6
Solomon River.								
Beloit, Kans.	75	16	1.8	27	0.5	4, 8, 9, 14, 15, 17–19	1.3	1.3
Smoky Hill River.								
Lindsborg, Kans	109	20	2.6	8	1.3	23	1.8	1.3
Abilene, Kans.	45	22	2.8	16	0.9	19–22	1.2	1.9
Kansas River.								
Manhattan, Kans.	116	18	5.9	31	2.7	16, 17, 20	3.8	3.2
Topeka, Kans. (8)	87	21	8.3	31	6.7	10	7.2	1.6
Osage River.								
Bagnell, Mo.	70	28	14.5	29	3.1	22	6.0	11.4
Gasconade River.								
Arlington, Mo.	98	16	11.8	28	1.0	12–17	3.1	10.8
Missouri River.								
Townsend, Mont. (a)	2,504	11	5.5	24	4.2	30, 31	4.8	1.3
Fort Benton, Mont. (a)	2,285	12	2.7	27	1.6	30	2.3	1.1
Wolfpoint, Mont. (9)	1,952	17	.....	.....	.....	.....	.....	.....
Bismarck, N. Dak.	1,309	14	3.7	21	1.2	1	2.5	2.5
Pierre, S. Dak. (27)	1,114	14	4.6	31	.....	.....	.....	.....
Sioux City, Iowa	784	19	11.3	29	2.0	7	6.2	9.3
Blair, Nebr.	705	15	9.3	31	2.6	15	5.1	6.7
Omaha, Nebr. (8)	669	18	11.8	31	3.4	9	6.2	8.4
Plattsmouth, Nebr.	641	17	6.6	31	−0.4	16, 17	2.7	7.0
St. Joseph, Mo	481	10	5.8	31	−1.2	20, 21	2.3	7.0
Kansas City, Mo.	388	21	12.8	30	5.1	18	8.4	7.7
Glasgow, Mo.	231	18	12.1	31	4.5	24	7.8	7.6
Boonville, Mo.	199	20	14.6	31	6.1	21	9.8	8.5
Hermann, Mo.	103	24	16.6	29	6.3	22	10.7	10.3
Minnesota River.								
Mankato, Minn.	127	18	5.4	9, 10, 31	3.1	24, 25	4.4	2.3
St. Croix River.								
Stillwater, Minn. (31)	23	11	.....	.....	.....	.....	.....	.....
Chippewa River.								
Chippewa Falls, Wis. (30)	75	16	.....	.....	.....	.....	.....	.....
Red Cedar River.								
Cedar Rapids, Iowa	77	14	16.9	30	4.2	14, 15, 19–25	6.1	12.7
Iowa River.								
Iowa City, Iowa	57	.....	9.9	2	1.4	24, 25	4.3	8.5
Des Moines River.								
Des Moines, Iowa (10)	205	19	11.7	30	3.3	23–25	6.1	8.4
Illinois River.								
La Salle, Ill	197	18	20.5	29	16.3	25	19.0	4.2
Peoria, Ill.	135	14	15.9	7–12	13.3	26	15.0	2.6
Beardstown, Ill.	70	12	14.2	31	12.8	1	13.6	1.4
Red Bank Creek.								
Brookville, Pa.	42	8	1.9	31	1.0	1–27	1.1	0.9
Clarion River.								
Clarion, Pa.	32	10	8.0	28	1.4	25, 26	2.6	6.6
Conemaugh River.								
Johnstown, Pa.	64	7	8.2	31	1.7	2, 3	2.7	6.5
Allegheny River								
Warren, Pa. (1)	177	14	7.3	28	0.8	3	1.9	6.5
Franklin, Pa	114	15	9.6	28	1.1	24, 25	3.1	8.5
Parker, Pa.	73	20	10.0	28	1.2	22–25	3.0	8.8
Freeport, Pa.	29	20	17.0	28	3.3	25	7.5	13.7
Springdale, Pa.	17	27	19.8	29	7.6	24	10.1	12.2
Cheat River.								
Rowlesburg, W. Va.	36	14	7.0	31	2.0	1	3.8	5.0
Youghiogheny River.								
Confluence, Pa.	59	10	7.7	31	0.9	1–3	2.1	6.8
West Newton, Pa.	15	23	11.3	31	1.4	2	3.2	9.9
Monongahela River.								
Weston, W. Va.	161	18	9.5	15	0.4	23–25, 29	1.8	9.1
Fairmont, W. Va.	119	25	24.0	16	15.4	1	17.2	8.6
Greensboro, Pa. (1)	81	18	18.1	16	7.8	2	10.6	10.3
Lock No. 4, Pa.	40	28	22.8	16	7.8	2	12.3	15.0
Beaver River.								
Ellwood Junction, Pa.	10	14	8.7	28	1.2	2	3.1	7.5
Muskingum River.								
Zanesville, Ohio	70	25	24.1	28	9.1	2, 3	11.8	15.0
Beverly, Ohio	20	25	22.2	29	6.0	2, 3	9.4	16.2
Little Kanawha River.								
Glenville, W. Va	77	20	14.0	20	1.0	11	3.6	13.0
Creston, W. Va.	38	20	19.5	16	3.2	13	6.9	16.3
New River.								
Radford, Va	155	14	2.5	20	0.7	1, 2, 11, 12	1.1	1.8
Hinton, W. Va.	95	14	5.7	16	2.2	3	3.7	3.5
Great Kanawha River.								
Charleston, W. Va.	58	30	15.8	16	4.7	13	8.2	11.1
Scioto River.								
Columbus, Ohio	110	17	15.6	28	3.0	26	5.3	12.6
Licking River.								
Falmouth, Ky.	30	25	22.4	31	3.0	1	8.6	19.4
Miami River.								
Dayton, Ohio	77	18	11.9	28	1.5	1, 2, 7	2.7	10.4
Kentucky River.								
Jackson, Ky.	287	24	18.8	31	5.3	13	6.7	13.5
Beattyville, Ky	254	30	10.0	31	1.5	12	3.2	8.5
Kentucky River—Cont'd.								
High Bridge, Ky.	117	17	20.2	31	10.8	14	13.2	9.4
Frankfort, Ky.	65	31	21.1	31	7.3	13	9.4	13.8
Wabash River.								
Terre Haute, Ind.	171	16	19.0	31	4.1	22	8.6	14.9
Mount Carmel, Ill.	75	15	18.0	31	5.9	1	10.9	12.1
Cumberland River.								
Burnside, Ky.	518	50	38.5	31	4.0	14	9.7	34.5
Celina, Tenn	383	45	30.7	31	7.4	14	12.5	23.3
Carthage, Tenn.	308	40	27.6	31	6.2	14	10.8	21.4
Nashville, Tenn	193	40	30.9	31	12.1	14, 26	16.3	18.8
Clarksville, Tenn.	126	42	36.0	31	13.0	14	18.3	23.0
Powell River.								
Tazewell, Tenn.	44	20	4.8	29	1.2	2, 3, 13, 14, 24	2.2	3.6
Clinch River.								
Speers Ferry, Va.	156	20	3.0	17	0.1	2	1.2	2.9
Clinton, Tenn	52	25	12.4	31	5.3	15	7.6	7.1
South Fork Holston River.								
Bluff City, Tenn.	35	15	3.5	16	1.0	12–14	1.7	2.5
Holston River.								
Mendota, Va.	165	12	4.5	16	1.1	2, 3, 12–14	2.0	3.4
Rogersville, Tenn.	103	14	4.6	17	2.2	13, 14	2.9	2.4
French Broad River.								
Asheville, N. C.	144	6	2.6	20	0.4	1, 2	1.1	2.2
Leadvale, Tenn.	79	15	6.0	16	1.3	2, 3, 13, 14	2.1	4.7
Dandridge, Tenn	46	15	5.3	16	1.7	2, 13, 14	2.5	3.6
Little Tennessee River.								
McGhee, Tenn.	17	20	7.6	31	3.6	2	5.0	4.0
Hiwassee River.								
Charleston, Tenn	18	22	9.8	20	1.7	2	4.0	8.1
Tennessee River.								
Knoxville, Tenn.	635	29	8.0	17	2.3	14	3.9	5.7
Loudon, Tenn	590	25	7.1	17	2.6	14	4.0	4.5
Kingston, Tenn.	556	25	9.4	31	3.3	14	4.9	6.1
Chattanooga, Tenn.	452	33	13.7	31	5.1	14	7.8	8.6
Bridgeport, Ala.	402	24	9.8	31	3.3	1, 2	6.0	6.5
Guntersville, Ala.	349	31	16.8	20	6.2	2	11.0	10.6
Florence, Ala.	255	16	11.0	31	3.8	2	7.4	7.2
Riverton, Ala.	225	26	17.4	21	6.6	2	11.9	10.8
Johnsonville, Tenn.	95	21	17.0	31	6.5	3	12.0	10.5
Ohio River.								
Pittsburg, Pa.	966	22	17.3	29	2.7	2	6.8	14.6
Davis Island Dam, Pa.	960	25	16.7	29	5.0	2, 3	8.3	11.7
Beaver Dam, Pa	925	27	25.5	29	6.4	2, 3	11.3	19.1
Wheeling, W. Va.	875	36	25.9	30	6.0	3	11.1	19.9
Parkersburg, W. Va.	785	36	30.1	31	8.5	2	13.0	21.6
Point Pleasant, W. Va.	703	39	34.8	31	9.4	13	16.6	25.4
Huntington, W. Va.	660	50	39.0	31	13.6	13	21.2	25.4
Catlettsburg, Ky.	651	50	40.0	31	13.3	13	21.6	26.7
Portsmouth, Ohio	612	50	42.4	31	14.4	2	23.0	28.0
Maysville, Ky.	559	50	40.5	31	14.4	1	22.7	26.1
Cincinnati, Ohio	499	50	44.8	31	15.8	1	26.3	29.0
Madison, Ind	413	46	38.1	31	14.0	1	23.2	24.1
Louisville, Ky.	367	28	19.1	31	6.4	1	9.6	12.7
Evansville, Ind.	184	35	34.0	31	12.2	1	22.6	21.8
Mount Vernon, Ind	148	35	32.8	31	11.9	1	21.9	20.9
Paducah, Ky.	47	40	33.2	31	13.7	1	23.4	19.5
Cairo, Ill.	1	45	41.2	31	25.4	1	31.9	15.8
St. Francis River.								
Marked Tree, Ark.	104	17	14.8	31	12.7	16–19	13.3	2.1
Neosho River.								
Neosho Rapids, Kans.	326	22	9.4	27	1.0	4–9, 17–20	1.8	8.4
Iola, Kans.	262	10	3.0	28	0.4	1, 14–21	0.9	2.6
Oswego, Kans.	184	20	4.1	30	0.7	12, 17–21	1.3	3.4
Fort Gibson, Ind. T.	3	22	19.0	26	10.5	20–23	12.5	8.5
Canadian River.								
Calvin, Ind. T.	99	10	3.7	30	2.4	17	3.0	1.3
Black River.								
Blackrock, Ark.	67	12	23.6	31	8.8	13	13.3	14.8
White River.								
Calicorock, Ark	272	15	30.4	28	4.1	13	9.9	26.3
Batesville, Ark.	217	18	29.4	28	6.2	14	12.0	23.2
Newport, Ark.	185	26	30.5	29	10.9	14, 15	16.6	19.6
Clarendon, Ark.	75	30	25.3	31	23.6	26	24.5	1.7
Arkansas River.								
Wichita, Kans.	832	10	1.0	3	−0.6	15–17	−0.1	1.6
Tulsa, Ind. T.	551	16	4.3	26	2.5	22	2.6	1.8
Webbers Falls, Ind. T.	465	23	16.8	28	6.0	10	8.5	10.8
Fort Smith, Ark.	403	22	17.3	29	4.5	14, 17–19	7.7	12.8
Dardanelle, Ark.	256	21	17.8	27	5.0	14, 15, 19	8.5	12.8
Little Rock, Ark.	176	23	19.4	30	7.2	15–17	10.2	12.2
Yazoo River.								
Greenwood, Miss	175	38	18.4	31	5.4	18	9.8	13.0
Yazoo City, Miss.	80	25	15.8	31	4.5	1	9.0	11.3
Ouachita River.								
Camden, Ark.	304	39	24.5	31	9.8	15	15.4	14.7
Monroe, La	122	40	29.4	1	21.9	27	25.1	7.5
Red River.								
Denison, Tex.	768	22	4.2	25	0.6	1	1.5	3.6
Arthur City, Tex.	688	27	12.0	26	6.5	17–19	8.6	5.5
Fulton, Ark.	515	28	21.4	31	12.5	20	15.7	8.9
Shreveport, La.	327	29	15.1	1, 2	8.0	29	11.1	7.1
Alexandria, La.	118	33	21.6	5	13.6	28	17.5	8.0
Mississippi River.								
Fort Ripley, Minn. (31)	2,082	10	.....	.....	.....	.....	.....	.....
St. Paul, Minn. (31)	1,954	14	.....	.....	.....	.....	.....	.....
Red Wing, Minn. (31)	1,914	14	.....	.....	.....	.....	.....	.....
Reeds Landing, Minn.	1,884	12	3.9	31	2.9	1	3.3	1.0
La Crosse, Wis. (31)	1,819	12	.....	.....	.....	.....	.....	.....
Prairie du Chien, Wis. (31)	1,759	18	.....	.....	.....	.....	.....	.....
Dubuque, Iowa (31)	1,699	18	.....	.....	.....	.....	.....	.....
Clinton, Iowa (27)	1,629	16	9.6	29	.....	.....	.....	.....
Leclaire, Iowa	1,609	10	6.6	31	1.0	19	3.8	5.6

TABLE VI.—*Heights of rivers referred to zeros of gages*—Continued.

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water. Height.	Highest water. Date.	Lowest water. Height.	Lowest water. Date.	Mean stage.	Monthly range.
Mississippi River—Cont'd.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Davenport, Iowa	1,593	15	9.6	30	4.6	25	6.8	5.0
Muscatine, Iowa	1,562	16	11.3	30, 31	5.8	26	8.3	5.5
Galland, Iowa	1,472	8	6.2	31	3.0	25	4.8	3.2
Keokuk, Iowa	1,463	15	11.6	31	5.2	25	8.4	6.4
Warsaw, Ill	1,458	18	14.7	31	8.0	21–24	11.2	6.7
Hannibal, Mo	1,402	13	12.9	31	6.6	25	9.9	6.3
Grafton, Ill	1,306	23	17.4	31	10.1	25	13.6	7.3
St. Louis, Mo	1,264	30	25.7	31	11.4	23	18.0	14.3
Chester, Ill	1,189	30	22.4	31	10.7	24	15.7	11.7
Cape Girardeau, Mo	1,128	28	26.8	31	15.5	24	20.2	11.3
New Madrid, Mo	1,003	34	31.9	31	20.6	1	25.9	11.3
Luxora, Ark	905	33	24.0	31	11.0	1	18.2	13.0
Memphis, Tenn	843	33	27.7	31	12.9	1	22.1	14.8
Helena, Ark	767	42	34.8	31	16.8	1	29.2	18.0
Arkansas City, Ark	635	42	38.5	31	22.2	1	33.1	16.3
Greenville, Miss	595	42	32.3	31	17.7	1	27.5	14.6
Vicksburg, Miss	474	45	34.8	31	18.8	1	29.5	16.0
Natchez, Miss	373	46	35.7	20	22.0	1, 2	30.5	13.7
Baton Rouge, La	240	35	26.4	18	17.1	4	22.7	9.3
Donaldsonville, La	188	28	20.7	19, 20, 31	12.7	4	17.6	8.0
New Orleans, La	108	16	13.6	20, 21	8.4	5	11.5	5.2
Atchafalaya River.								
Simmesport, La	127	33	30.5	31	22.6	3–5	27.3	7.9
Melville, La	103	31	30.8	31	25.2	4, 5	28.6	5.6
Morgan City, La	19	8	4.9	29	2.0	3	3.4	2.9
Grand River.								
Eaton Rapids, Mich	166	6	4.2	29–31	3.7	1, 2, 21–26	3.9	0.5
Lansing, Mich	140	11	7.0	29	1.9	25	4.2	5.1
Grand Ledge, Mich	129	6	5.0	28, 29	1.9	19–23	2.9	3.1
Portland, Mich	103	12	8.7	1	2.9	26	4.4	5.8
Ionia, Mich	81	24	16.4	5	8.8	22, 25	12.0	7.6
Lowell, Mich	65	19	9.8	5, 6	3.8	23	6.6	6.0
Grand Rapids, Mich	38	11	7.0	6, 7	1.9	23, 25	4.0	5.1
Sandusky River.								
Tiffin, Ohio	65	8	6.1	29	0.6	1, 25, 26	1.5	5.5
Maumee River.								
Napoleon, Ohio (11)	44	13	6.8	29	0.3	10	1.8	6.5
Penobscot River.								
Mattawamkeag, Me. (31)	87	..	......	......	......	......	......	......
West Enfield, Me. (31)	60	..	......	......	......	......	......	......
Kennebec River.								
Winslow, Me	46	8	5.1	31	2.9	4, 14	3.7	2.2
Merrimac River.								
Franklin Junction, N.H	110	13	6.1	30, 31	4.1	25	4.7	2.0
Concord, N. H. (12)	94	10	2.8	30, 31	0.9	23–26	1.4	1.9
Manchester, N. H	68	8	3.9	29	1.0	16	2.6	2.9
Connecticut River.								
Wells River, Vt. (31)	255	......	......	......	......	......	......	......
Whiteriver Junction, Vt	209	......	8.8	29	4.8	25–27	5.8	4.0
Bellows Falls, Vt. (8)	170	12	4.8	31	2.0	10, 12, 23	2.7	2.8
Holyoke, Mass	84	9	4.3	5	– 3.1	16	2.0	7.4
Hartford, Conn	50	13	12.1	5	2.4	25	5.9	9.7
Housatonic River.								
Gaylordsville, Conn	44	15	8.4	4	4.3	25	5.4	4.1
Mohawk River.								
Utica, N. Y	98	6	11.3	28	1.8	26	4.3	9.5
Tribeshill, N. Y	42	12	6.7	4	0.0	27	2.1	6.7
Schenectady, N. Y	19	15	10.2	4	0.8	22–27	3.0	9.4
Hudson River.								
Glens Falls, N. Y	197	20	5.3	5	3.6	26	4.4	1.7
Troy, N. Y	154	14	8.4	31	3.2	24	6.1	5.2
Albany, N. Y	147	12	12.4	4	1.0	18	5.0	11.4
Stuyvesant, N. Y	128	9	5.5	30	0.0	21, 22	2.4	5.5
Pompton River.								
Pompton Plains, N. J	6	8	6.3	4	4.4	21–26	4.7	1.9
Passaic River.								
Chatham, N. J	69	7	4.9	4, 5	2.5	24, 25	3.3	2.4
Lehigh River.								
Mauchchunk, Pa. (2)	45	15	9.6	4	4.1	25, 26	4.8	5.5
Schuylkill River.								
Reading, Pa	66	12	13.3	4	0.4	25–27	1.7	12.9
Delaware River.								
Hancock (E. Branch), N. Y	269	12	10.6	2	3.4	16	4.9	7.2
Hancock (W. Branch), N. Y	269	10	8.3	28	3.1	23	4.4	5.2
Port Jervis, N. Y	204	14	7.5	5	0.9	24–26	2.6	6.6
Phillipsburg, N. J	142	26	13.6	5	2.2	26	5.9	11.4
Trenton, N. J	92	18	8.9	5	1.8	27, 28	3.6	7.1
North Branch Susquehanna.								
Binghamton, N. Y	183	16	9.9	29	2.4	25, 26	4.3	7.5
Towanda, Pa	139	16	10.2	31	1.6	26, 27	3.7	8.6
Wilkes-Barre, Pa	60	17	17.6	29	4.2	23, 24	7.6	13.4
West Branch Susquehanna.								
Clearfield, Pa	165	8	5.3	28	1.3	1–3, 19–26	1.8	4.0
Renovo, Pa. (12)	90	16	7.2	31	1.0	20, 21	2.6	6.2
Williamsport, Pa	39	20	9.0	29	1.3	2	3.0	7.7
Juniata River.								
Huntingdon, Pa	90	24	7.9	31	3.4	1, 2	4.2	4.5
Susquehanna River.								
Selinsgrove, Pa	116	17	8.5	30	1.2	26, 27	3.2	7.3
Harrisburg, Pa	69	17	10.5	30	2.4	24–27	4.2	8.1
Shenandoah River.								
Riverton, Va	58	22	4.0	29	– 0.5	1–26	–0.1	4.5
Potomac River.								
Cumberland, Md	290	8	8.0	28	2.8	1–3	3.7	5.2
Harpers Ferry, W. Va	172	18	13.8	29	1.0	2, 3	4.2	12.8
James River.								
Buchanan, Va	305	12	8.0	28	2.4	1–3	4.4	5.6
Lynchburg, Va	260	18	5.6	31	0.8	1, 2	2.8	4.8
Columbia, Va	167	18	12.3	31	3.3	2	7.5	9.0
Richmond, Va	111	12	4.8	31	– 0.3	4	1.7	5.1
Dan River.								
Danville, Va	55	8	3.6	20	0.1	12–14	0.8	3.5

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water. Height.	Highest water. Date.	Lowest water. Height.	Lowest water. Date.	Mean stage.	Monthly range.
Roanoke River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Clarksville, Va	196	12	7.1	31	0.8	13, 14	2.4	6.3
Weldon, N. C	129	30	26.3	21	10.6	14, 15	15.2	15.7
Tar River.								
Tarboro, N. C	46	25	14.3	23	7.1	15	9.8	7.2
Greenville, N. C	21	22	12.8	25	8.5	1	10.7	4.3
Haw River.								
Moncure, N. C	171	25	20.4	31	8.6	15	10.2	11.8
Cape Fear River.								
Fayetteville, N. C	112	38	30.1	31	7.3	3	13.0	22.8
Waccamaw River.								
Conway, S. C	40	7	7.6	1	5.0	29	6.0	2.6
Pedee River.								
Cheraw, S. C	149	27	24.5	21	3.1	15	8.9	21.4
Smiths Mills, S. C	51	16	14.3	29	8.5	7, 8	11.0	5.8
Lynch Creek.								
Effingham, S. C	35	12	8.6	22	5.4	7, 8	7.1	3.2
Black River.								
Kingstree, S. C. (b)	45	12	8.7	1	7.3	8, 9	8.0	1.4
Catawba River.								
Mount Holly, N. C	28	15	6.7	16	2.2	4, 5, 7	3.2	4.5
Wateree River.								
Camden, S. C	37	24	25.8	21	7.6	3	12.5	18.2
Broad River.								
Blairs, S. C	36	14	11.7	20	1.6	3, 14	3.6	10.1
Saluda River.								
Chappels, S. C	56	14	16.3	21	3.6	3, 4	7.4	12.7
Congaree River.								
Columbia, S. C	52	15	14.9	21	1.6	5	4.8	13.3
Santee River.								
St. Stephens, S. C	50	12	10.6	28	6.7	6–8	8.3	3.9
Edisto River.								
Edisto, S. C	75	6	4.9	13–16, 23	3.7	7	4.4	1.2
Broad River.								
Carlton, Ga	30	11	15.7	20	2.4	1, 2	5.1	13.3
Savannah River.								
Calhoun Falls, S. C	347	15	11.8	20	2.8	2	4.5	9.0
Augusta, Ga	268	32	28.6	21	8.6	4	14.1	20.0
Oconee River.								
Milledgeville, Ga	147	25	18.3	22	3.4	1	8.5	14.9
Dublin, Ga	79	30	17.5	25	2.5	4	8.1	15.0
Ocmulgee River.								
Macon, Ga	203	18	17.0	21	3.4	2	8.8	13.6
Abbeville, Ga	96	11	13.8	27	5.9	2, 3	9.1	7.9
Flint River.								
Woodbury, Ga	227	10	7.8	21	0.8	1	2.9	7.0
Montezuma, Ga	152	20	14.4	24	4.9	1, 2	8.1	9.5
Albany, Ga	90	20	13.7	27	4.3	2	8.8	9.4
Bainbridge, Ga. (c)	29	22	13.3	29	8.6	19	10.7	4.7
Chattahoochee River.								
Oakdale, Ga	305	18	21.0	20	2.4	1, 2	7.7	18.6
West Point, Ga	239	20	18.7	20	3.1	1, 2	7.2	15.6
Eufaula, Ala	90	40	36.2	22	3.0	16	12.7	33.2
Alaga, Ala	30	25	29.7	23	6.1	1	14.9	23.6
Coosa River.								
Rome, Ga	266	30	28.2	21	2.0	1, 2	10.2	26.2
Gadsden, Ala	162	22	24.8	22	2.6	2	12.9	22.2
Lock No. 4, Ala	113	17	22.2	20	2.5	2	11.1	19.7
Wetumpka, Ala	12	45	51.5	20	7.1	2	25.3	44.4
Tallapoosa River.								
Milstead, Ala	42	35	42.8	21	3.2	2	12.9	39.6
Alabama River.								
Montgomery, Ala	323	35	50.2	22	4.4	2	23.3	45.8
Selma, Ala	246	35	50.2	24	7.0	3	26.7	43.2
Black Warrior River.								
Tuscaloosa, Ala	90	43	56.8	20	11.3	15	30.8	45.5
Tombigbee River.								
Columbus, Miss	316	33	18.0	31	0.3	14	7.7	17.7
Vienna, Ala	246	42	30.8	22	4.2	15	15.4	26.6
Demopolis, Ala	168	35	52.8	26	11.0	16	32.3	41.8
Leaf River.								
Hattiesburg, Miss	60	20	20.5	21	4.2	14	9.2	16.3
Chickasawhay River.								
Enterprise, Miss	144	18	29.4	21	2.4	16–18	9.1	27.0
Shubuta, Miss	106	25	39.6	21	7.0	13, 14	18.6	32.6
Pascagoula River.								
Merrill, Miss	78	20	21.7	25	7.7	14	14.1	14.0
Pearl River.								
Jackson, Miss	242	20	29.6	29, 30	3.7	17	13.9	25.9
Columbia, Miss	110	14	23.0	23, 24	6.9	2	12.7	16.1
Sabine River.								
Logansport, La	315	25	26.0	31	7.6	26	14.2	18.4
Neches River.								
Rockland, Tex	105	20	8.6	30	3.2	27	6.1	5.4
Beaumont, Tex	18	10	2.1	25	1.2	16	1.6	0.9
Trinity River.								
Dallas, Tex	320	25	17.5	8	5.9	30	8.5	11.6
Long Lake, Tex	211	35	29.9	1	8.9	26	14.7	21.0
Riverside, Tex	112	40	20.9	1	4.5	27, 28	9.1	16.4
Liberty, Tex	20	25	21.4	2, 3	8.4	31	13.7	13.0
Brazos River.								
Kopperl, Tex	345	21	0.0	1–7	– 0.2	8–31	–0.2	0.2
Waco, Tex	285	24	3.3	8	2.7	26–28	2.9	0.6
Valley Junction, Tex	215	40	3.6	30	2.5	27	2.9	1.1
Hempstead, Tex	140	40	5.6	1	0.5	27–31	1.5	5.1
Booth, Tex	61	39	6.4	1, 2	4.3	30, 31	5.2	2.1
Colorado River.								
Ballinger, Tex	489	21	1.9	7	1.0	18–28	1.4	0.9
Austin, Tex	214	18	2.6	28	1.3	1–5, 7–11, 16–23, 26, 27	1.4	1.3
Columbus, Tex	98	24	11.2	30	6.5	23–29	6.9	4.7

TABLE VI.—*Heights of rivers referred to zeros of gages*—Continued.

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water. Height.	Highest water. Date.	Lowest water. Height.	Lowest water. Date.	Mean stage.	Monthly range.
Guadalupe River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Gonzales, Tex	112	22	0.9	7, 30, 31	0.7	3, 4, 19, 22, 23	0.8	0.2
Victoria, Tex	35	16	2.1	29	1.7	21	1.9	0.4
Red River of the North.								
Moorhead, Minn. (²²)	284	26	12.1	31	9.8	1	......	2.3
Kootenai River.								
Bonners Ferry, Idaho (¹⁰)	123	24	0.0	31	−1.0	24, 25	−0.7	1.0
Pend d'Oreille River.								
Newport, Wash. (³)	86	14	−0.4	31	−2.0	12	−0.8	1.6
Snake River.								
Lewiston, Idaho	144	24	9.4	29	2.2	6, 7	3.8	7.2
Riparia, Wash	67	30	8.4	29	2.6	21–23	4.0	5.8
Columbia River.								
Wenatchee, Wash	473	40	6.1	5, 9, 10	4.9	18–20	5.6	1.2
Umatilla, Oreg. (ᵈ)	270	25	5.7	30	1.6	22–24	2.7	4.1
The Dalles, Oreg	166	40	9.2	31	1.4	23	3.4	7.8
Willamette River.								
Albany, Oreg	118	20	11.4	1	3.8	19, 20	5.6	7.6
Salem, Oreg	84	20	10.7	1	2.7	18–21	4.6	8.0
Portland, Oreg	12	15	9.4	1	2.4	19	4.8	7.0
Sacramento River.								
Red Bluff, Cal	201	23	25.5	31	6.4	20	11.9	19.1
Sacramento, Cal	64	25	26.1	31	20.9	3	22.5	5.2

Figures after names of stations indicate number of days frozen. (ᵃ) 16 days only. (ᵇ) 2 days missing. (ᶜ) 8 days missing. (ᵈ) 1 day missing.

Honolulu, T. H., latitude 21° 19′ north, longitude 157° 52′ west; barometer above sea, 38 feet; gravity correction, —.057, applied. March, 1906.

Day.	Pressure.* 8 a. m.	Pressure.* 8 p. m.	Air temperature. 8 a. m.	Air temperature. 8 p. m.	Air temperature. Maximum.	Air temperature. Minimum.	Moisture. 8 a. m. Wet.	Moisture. 8 a. m. Relative humidity.	Moisture. 8 p. m. Wet.	Moisture. 8 p. m. Relative humidity.	Wind. 8 a. m. Direction.	Wind. 8 a. m. Velocity.	Wind. 8 p. m. Direction.	Wind. 8 p. m. Velocity.	Precipitation. 8 a. m.	Precipitation. 8 p. m.	Clouds. 8 a. m. Amount.	Clouds. 8 a. m. Kind.	Clouds. 8 a. m. Direction.	Clouds. 8 p. m. Amount.	Clouds. 8 p. m. Kind.	Clouds. 8 p. m. Direction.
1	30.11	30.10	72.0	72.1	77	70	67.0	77	63.3	62	ne.	6	ne.	8	T.	0.04	2 5	S.-cu. N.	e. e.	few.	Cu.	e.
2	30.11	30.07	73.2	70.1	77	68	64.2	61	66.1	81	e.	5	ne.	5	0.00	0.02	1 1	Cu. S.-cu.	e. e.	2 7	S.-cu. N.	e. e.
3	30.08	30.04	72.7	71.3	78	68	64.4	64	63.7	66	e.	9	ne.	5	0.02	0.00	4 2	Cu. S.-cu.	e. e.	few.	S.-cu.	e.
4	30.04	29.98	71.0	71.0	75	63	63.0	64	65.1	73	ne.	3	ne.	5	0.00	0.00	few.	Cu.	0	7	S.-cu	nw.
5	29.99	29.95	70.8	70.9	76	65	64.6	71	63.5	66	ne.	5	ne.	7	0.02	0.01	7 2	Ci.-s. S.-cu.	n. 0	4 5	S.-cu. N.	ne. ne.
6	29.93	29.78	71.5	72.4	75	63	63.3	64	65.4	69	ne.	1	sw.	17	T.	0.00	few.	S.-cu.	0	2	Cu.	sw.
7	29.68	29.72	74.0	65.2	74	61	72.3	92	56.5	58	sw.	38	nw.	10	0.10	0.17	10	S.-cu.	w.	1 1	Cu. S.-cu.	w. w.
8	29.88	29.94	65.0	65.0	72	60	56.8	60	56.4	58	nw.	6	n.	8	0.00	0.00	1	S.-cu.	w.	few.	Cu.	w.
9	30.02	30.05	66.0	66.6	72	64	58.1	62	60.0	68	n.	4	n.	4	0.00	0.00	10	S.-cu.	n.	7	S.-cu.	n.
10	30.07	30.06	69.3	67.8	75	62	60.0	58	59.3	60	ne.	12	ne.	8	0.00	0.00	1	S.-cu.	e.	6 1	A.-cu. S.-cu.	ne. 0
11	30.06	29.98	70.0	68.8	76	65	60.5	57	61.3	65	n.	3	ne.	9	0.00	0.00	9	S.-cu.	ne.	few.	S.-cu.	ne.
12	30.01	30.00	71.0	69.6	74	60	62.2	61	62.8	69	ne.	2	nw.	4	0.00	0.00	1	Ci.-cu.	w.	few.	S.-cu.	0
13	30.03	30.04	72.0	69.0	77	65	63.2	62	62.5	70	n.	2	ne.	8	0.00	0.23	few.	Cu.	0	2	S.-cu.	0
14	30.05	30.04	70.0	69.1	78	65	65.0	77	64.4	78	n.	1	ne.	6	T.	0.00	9	A.-cu.	sw.	1	S.-cu.	0
15	29.99	29.91	73.0	73.0	76	65	67.0	73	67.1	73	se.	7	sw.	10	0.00	0.00	1	Cu.	se.	7	S.-cu.	sw.
16	29.90	29.91	64.0	65.6	73	64	63.1	95	56.6	57	nw.	11	n.	8	0.55	0.28	10	N.	w.	3	S.-cu.	w.
17	29.97	29.94	65.2	64.3	72	61	56.8	59	56.3	60	n.	9	n.	7	0.00	0.00	7 2	Cu. S.-cu.	w. w.	2	S.-cu.	nw.
18	29.98	30.00	65.3	65.2	71	61	58.0	64	58.0	65	n.	9	n.	6	0.00	T.	9	S.-cu.	w.	4	S.-cu.	?
19	30.00	29.99	64.4	64.1	73	58	58.6	71	57.3	66	nw.	3	n.	5	0.00	0.00	2	S.-cu.	n.	few.	S.-cu.	0
20	29.99	29.91	69.0	68.5	73	58	59.3	56	62.4	71	ne.	2	nw.	4	0.00	0.00	few.	S.-cu.	0	2	S.-cu.	n.
21	29.93	29.89	68.0	67.4	74	63	64.3	82	60.0	65	nw.	3	n.	4	0.01	0.00	1 9	Ci.-cu. S.-cu.	w. w.	1	S.-cu.	w.
22	29.93	29.92	68.0	65.1	74	63	60.1	63	58.1	66	nw.	4	nw.	5	0.00	0.00	1 8	Ci.-cu. A.-cu.	w. w.	2	S.-cu.	?
23	29.96	29.89	68.0	67.8	74	62	62.3	73	60.0	63	ne.	3	n.	4	0.05	0.01	3 1	Ci.-s. Ci.	w. sw.	4	S.-cu.	sw.
24	30.02	30.05	67.2	67.4	73	62	59.8	65	61.3	71	ne.	1	ne.	4	0.01	0.00	5	A.-s.	w.	1	S.-cu.	nw.
25	30.13	30.12	64.8	68.0	72	63	61.5	82	58.5	56	n.	8	ne.	21	0.11	0.01	3 7	S.-cu. N.	n. ne.	2	S.-cu.	ne.
26	30.16	30.16	68.0	66.0	71	64	61.2	68	58.4	63	n.	12	n.	10	T.	T.	9 1	S.-cu. N.	e. e.	5 4	Ci.-s. S.-cu.	w. ne.
27	30.15	30.12	67.4	66.0	70	64	57.8	55	57.0	57	n.	8	n.	5	0.00	T.	8	S.-cu.	ne.	10	S.-cu.	ne.
28	30.14	30.14	67.4	66.8	71	63	59.2	61	56.4	51	ne.	12	ne.	11	T.	0.00	6 3	Ci.-s. S.-cu.	w. ne.	2	S.-cu.	ne.
29	30.15	30.13	69.0	69.5	73	65	59.4	57	60.9	61	ne.	14	ne.	11	0.00	T.	8	S.-cu.	e.	10	S.-cu.	e.
30	30.08	30.04	70.5	71.0	75	68	62.8	65	64.6	70	e.	14	ne.	9	T.	T.	9 1	S.-cu. N.	se. se.	1 8	A.-cu. S.-cu.	n. ne.
31	30.02	29.98	72.4	71.2	78	66	64.4	65	64.9	71	ne.	2	se.	3	0.01	0.00	5 1	Ci.-cu. S.-cu.	w. e.	6 2	Ci.-s. S.-cu.	w. s.
Mean	30.018	29.998	69.0	68.3	74.2	63.5	61.9	67.2	60.9	65.5	ne.	7.1	ne.	7.5	0.88	0.77	6.0	S.-cu.	w.	3.9	S.-cu.	ne., w.

Observations are made at 8 a. m. and 8 p. m., local standard time, which is that of 157° 30′ west, and is 5ʰ and 30ᵐ slower than 75th meridian time. * Pressure values are reduced to sea level and standard gravity.

MEXICAN CLIMATOLOGICAL DATA.

By Señor MANUEL E. PASTRANA, Director of the Central Meteorologic-Magnetic Observatory.

November, 1905.

Stations.	Altitude.	Mean barometer.*	Temperature.			Relative humidity.	Precipitation.	Prevailing direction.	
			Max.	Min.	Mean.			Wind.	Cloud.
	Feet.	Inches.	° F.	° F.	° F.	%	Ins.		
Aguascalientes (Seminario.)	6,330	24.15	80.2	40.6	63.0	66	0.00	ne.	
C. Juarez	3,805	25.68	78.8	38.5	53.6	83	2.74		
Chihuahua	4,684	25.31	76.1	41.4	57.0	61	2.74	ne.	sw.
Colima (Seminario)	1,663	28.57	91.0	61.2	75.9	76	0.28	sw.	
Culiacan	112	29.74	92.8	58.6	75.4	81	6.48	ne.	
Guadalajara (Obs. Ast.)	5,186	24.98	80.6	51.8	67.1	72	0.80		
Guadalajara (Seminario.)		25.06	84.6	50.7	66.0	65	0.40	nw.	
Hugotitan, Hda (Jalasco.)	5,228	24.98	82.8	41.0	64.0	73	0.28	se.	
Guanajuato	6,717	23.74	83.5	47.1	65.3	53	0.17	sw.	
Jalapa	4,681	25.59	82.0	53.2	64.4	84	4.65	n.	
Lampazos	1,181	28.94	93.2	48.2	63.5	81	2.49	n.	
Leon	5,906	24.39	80.6	47.1	65.1	66	0.31	s.	s.
Linares	1,188	28.78	91.4	46.4	67.5	85			
Mazatlan	24	29.96	86.4	62.4	77.5	80	5.48	nw.	w.
Mexico (Obs. Cent.)	7,472	23.07	74.8	44.6	59.5	64	0.24	nw.	sw.
Morelia (Seminario)	6,401	24.16	79.7	50.9	60.8	64	0.10	s.	se.
Puebla (Col. d Est.)	7,118	23.42	83.5	38.1	60.4	65	0.24	ne.	ne.
San Juan de Ulna	39	30.01	86.0	68.2	82.2	63	2.94	nw.	
San Luis Potosi	6,202	24.14	78.8	46.4	63.5	87	0.30	e.	
Zacatecas	8,015	22.60	77.4	43.7	58.3	59	0.89	sw.	ne.

December, 1905.

Aguascalientes (Seminario.)	6,330								
C. Juarez	3,805	26.24	59.0	31.3	40.8	82	0.83		
Chihuahua	4,684	25.31	76.1	44.1	57.0	61	2.89	ne.	sw.
Colima (Seminario)	1,663	28.54	91.8	51.6	70.2	74	4.81	n.	
Culiacan	112	29.76	87.8	38.8	66.6	72	0.81	ese.	
Guadalajara (Obs. Ast.)	5,186	24.96	77.0	37.4	59.0	66	1.48	n.	
Guadalajara (Seminario.)		25.02	79.2	38.7	57.9	61	2.00	sw.	
Hugotitan, Hda (Jalasco.)	5,228								
Guanajuato	6,717	23.66	81.7	35.1	56.5	52	2.72	w.	
Jalapa	4,681	25.59	80.4	41.5	55.4	86	3.65		
Lampazos	1,181	28.99	80.6	32.9	59.6	73	2.20	n.	
Leon	5,906	24.35	76.6	36.9	57.0	71	2.08	s.	s.
Linares	1,188	28.84	78.8	28.4	52.7	73	2.40		
Mazatlan	24	29.98	79.5	55.9	69.8	74	3.17	nw.	w.
Mexico (Obs. Cent.)	7,472	23.07	73.4	33.6	52.7	60	0.07		
Morelia (Seminario)	6,401	23.95	78.3	35.6	54.9	60	0.71		se.
Pueblo (Col. d Est.)	7,118	23.39	74.8	34.2	52.2	68	0.71	ne.	
San Juan de Ulna	39	30.06	79.5	55.6	68.0	81		n.	
San Luis Potosi	6,202	24.11	74.8	30.2	54.5	57	0.87	e.	
Zacatecas	8,015	22.55	74.5	41.9	47.7	59	2.44	sw.	

January, 1906.

Stations.	Altitude.	Mean barometer.*	Temperature.			Relative humidity.	Precipitation.	Prevailing direction.	
			Max.	Min.	Mean.			Wind.	Cloud.
	Feet.	Inches.	° F.	° F.	° F.	%	Ins.		
C. Juarez	3,805	26.27	67.5	31.3	40.5	77	0.68	nw.	
Chignahuapan	8,276	22.41	72.5	20.5	45.9	54	T		
Chihuahua	4,684	25.37	79.7	23.7	45.1	43	0.02	e.	sw.
Colima (Seminario)	1,663		87.8	48.7	69.3	78	0.79	sw.	
Guadalajara (Obs. Ast.)	5,186	24.94	75.2	33.8	58.1	54	T.		
Guanajuato	6,717	23.71	81.0	25.2	54.9	40	0.05	w.	
Jalapa	4,681	25.62	81.0	26.6	64.8	80	1.96	n.	
Lampazos	1,181	29.00	86.9	32.7	52.5	62		n.	n.
Leon	5,906	24.38	73.6	25.5	54.9	57	0.07	w.	sw.
Linares	1,188	28.84	86.0	26.6	56.1	58	0.47	s.	
Mazatlan	24	30.00	82.6	56.7	69.6	87	1.53	nw.	w.
Mexico (Obs. Cent)	7,472	23.09	72.0	27.3	51.4	53		nw.	
Monterey	1,625	28.16	85.1	33.1	52.9	42	0.05	ne.	n.
Morelia (Seminario)	6,401	23.96	73.4	35.6	60.6	61	0.00	n.	
Parral	5,674	24.61	79.2	14.0	45.7		0.50	w.	w.
Pueblo (Col. d Est.)	7,118	23.40	75.6	28.6	51.6	55	T.	ne.	s.
Saltillo	5,399	24.87	72.9	22.5	46.9	63	T.	sw.	
San Luis Potosi	6,202	24.13	71.6	39.2	50.9	60	0.28	e.	
Zacatecas	8,015	22.55	76.8	18.5	46.0	49	0.65	sw.	s.

*The monthly barometric means are reduced to the international standard of gravity.

RAINFALL IN JAMAICA.

Through the kindness of Dr. H. H. Cousins, chemist to the government of Jamaica and now in charge of the meteorological service of that island, we have received the following table.

Comparative table of rainfall.

[Based upon the average stations only.]

MARCH, 1906.

Divisions.	Relative area.	Number of stations.	Rainfall.	
			1906.	Average.
	Per cent.		Inches.	Inches.
Northeastern division	25	23	8.28	4.84
Northern division	22	50	3.49	2.59
West-central division	26	22	5.85	4.68
Southern division	27	32	4.37	2.81
Means	100		5.50	3.73

The rainfall for March was therefore very much above the average for the whole island. The greatest fall, 20.49 inches, occurred at Shrewsbury, in the northeastern division, while the least, 0.42 inch, was recorded at Bull Bay, in the southern division.

COSTA RICAN CLIMATOLOGICAL DATA.

Communicated by Señor Anastasio Alfaro, director of the Physico-Geographic Institute of San José.

FEBRUARY, 1906.

[Altitude, San José, 3835 feet. $\phi = 9° 56' 1.3''$ N. $\lambda = 84° 4' 10.75''$ W. of Greenwich.]

Temperature:	° F.
Mean	66.6
Average of daily maxima	79.5
Average of daily minima	57.8
Highest temperature of the month	87.6
Lowest temperature of the month	54.0
Pressure:	Inches.
Mean, corrected for temperature	26.30
Maximum, corrected for temperature	26.39
Minimum, corrected for temperature	26.12
Mean, reduced to standard gravity	26.20
Mean, reduced to sea level	30.08
Relative humidity:	Per cent.
Mean	72.7
Maximum	97.0
Minimum	41.0
Rainfall:	
Total for the month, inches	0.181
Duration, in hours	5:34
Miscellaneous phenomena:	
Sunshine, hours	200.39
Earthquakes, number	22
Average intensity of earthquakes (Rossi-Forel scale)	II
Mean velocity of wind, per second (feet)	*5.6

Rain at Costa Rican stations outside of San José.

	Altitude.	Latitude.	Longitude.	Amount.
	Feet.	North.	West of Greenwich.	Inches.
Juan Viñas	3288			2.40
Las Lomas	876			0.75
Nuestro Amo				4.65
Paraiso	4396			1.97
Peralta	1089			0.39
San Carlos				?
San Juan de Dios de Desamparados	3757	84° 4' 46.6"	9° 53' 5.6"	0.28
Santiago				1.18
Siquirres	187			3.74
Swamp Mouth				10.63
Tuis	2136			3.86

NOTE.—The above barometric readings for February, at San José, are corrected for temperature and gravity, but the data published for January (MONTHLY WEATHER REVIEW for January, 1906, p. 60), were not reduced to standard gravity.

The scale of intensity for earthquakes is the Rossi-Forel, as in preceding years; but in our experience we find that for earthquakes characterized by ringing the bell the scale number is too small, while for those characterized by the fall of plaster and cracks of buildings the scale number is too large.

*Equivalent to 3.8 miles per hour.